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Anritsu

SERVICE MANUAL

MICROWAVE RADIO TEST SET

ME645A

SUPPLIER: ANRITSU AMERICA, INC.

MANUFACTURER: ANRITSU ELECTRIC CO., LTD.

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SERVICE MANUAL

This is the Service Manual for Microwave Radio Test Set (MRTS) ME645A and contains the folloiwng information:

Calibration and Adjustment: Describes calibration and adjustment performed at acceptance test and routine calibration.

Troubleshooting and Repair: Describes troubleshooting and repair when a malfunction occurs. This section also contains a description of circuit operation and schematic diagrams.

Replaceable Parts: Contains lists of replaceable parts, and a description of the parts ordering procedure. There is a separate MRTS Operation Manual. Refer to the manual for general information, panel description, performance tests (Back-to-back checks), and measurements.

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SECTION 1 CALIBRATION AND ADJUSTMENT

SECTION 2 TROUBLESHOOTING AND REPAIR

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SECTION 4 ASSEMBLIES

SECTION 1

CALIBRATION AND ADJUSTMENT

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1. INTRODUCTION

1.01 This section describes the calibration and adjustment procedures at acceptance tests, routine maintenance, and after repair. Refer to item 3 of Section 2 of the Operation Manual for simple performance checks.

A. Routine Calibration

1.02 The specifications for this test set are shown in item 3 of Section 1 of the Operation Manual. Perform checks and calibration every 6 – 12 months and determine the need for repair or overhaul based on these checks. The test equipment required for these checks and calibrations and their required ratings are shown in Table B.

B. Maintenance Work Notes

(a) Check that the voltage of the AC power line to be connected to the test set is AC115V ±12V.

(b) Check that the POWER switch of the displaying unit is in the OFF position.

Danger: Lethal voltage is present on parts marked:

WARNING
HAZARDOUS VOLTAGE UNDERNEATH
REMOVEL OF COVER MAY INTERRUPT SERVICE

Do not touch these parts by hand.

C. General Maintenance

Table A—General Maintenance

Check	Period	Procedure
Dirt	o Before storing for an extended period of time o When used in a dusty environment o When dirt is noticeable	Wipe off with industrial cleaning solvent
Dust, etc.		Remove the cover and blow out with compressed air
Lubrication	Unnecessary	
Loose knobs screws	When found	Retighten

D. Maintenance and Repair Equipment

Table B—Recommended Test Equipment

No.	Recommended Instrument	Instrument Type and Specification	Required for
1	HP Model 435A-K06	Frequency/Power Reference Frequency Accuracy 1.5×10^{-11}/year Power Accuracy ±1.2%/year	o Power meter calibration o Time Base Oscillator Calibration
2	HP Model 1740A (or Model 1722B)	Oscilloscope Frequency Range: DC to 100MHz	o Time Base Oscillator Calibration o Printed Circuit Board Troubleshooting (Displaying Unit)
3	HP Model 1722B	Oscilloscope Frequency Range: DC to 275MHz	o Printed Circuit Board Troubleshooting (Sending Unit)
4	HP Model 8672A	Synthesized Signal Generator Frequency Range: 2GHz to 18GHz	o Frequency Counter Troubleshooting
5	Anritsu Model MG545K	Synthesized Signal Generator Frequency Range: 10kHz to 500MHz	o Frequency Counter Troubleshooting o Spectrum Function Troubleshooting o Power Meter Calibration o IF Sweep Generator Calibration
6	HP Model 5342A	Counter Frequency Range: 10Hz to 18GHz	o IF/RF Sweep Generator Calibration Troubleshooting
7	HP Model 3465A	Digital Multimeter DC Volts Range: 10mV to 1000V	o CRT Section Calibration o Digital Volt Meter Calibration o Power Supply Voltage Check o Printed Circuit Board Bias Check
8	HP Model 6116A	Power Supply Output voltage: 0 to 100V	o CRT Section Calibration o Digital Voltmeter Calibration

Table B (Cont)

No.	Recommended Instrument	Instrument Type and Specification	Required for
9	HP Model 8481A + 435A	Power Meter Frequency Range: 10MHz to 18GHz Input Level Range: −30dBm to +20dBm	o Power Meter Calibration and Troubleshooting
10	Anritsu Model ME645A	Calibrated Standard MRTS	o IF Sweep Generator Calibration o RF Sweep Generator Calibration

Note: An accurately calibrated MRTS must be available for the Section 2 troubleshooting and repair work because it is used as a reference instrument.

E. Panel Controls Numbers

1.03 The panel controls numbers used in this manual are described in Section 2, item 2 MRTS Panel Description of the operation manual.

2. POWER METER

A. Reference Oscillator Calibration

2.01 The output level accuracy and frequency of the CAL OUTPUT 0dBm terminal (14) are important elements to assure the accuracy of the power meter. The cal output level must be maintained at a range equivalent to that of the HP Model 435A -K06 FREQUENCY POWER REFERENCE output level (0dBm). In addition, the output frequency must be maintained within 50 ±1MHz.

2.02 *Calibration Procedure:* (Power calibration is performed after frequency calibration)

STEP	PROCEDURE
1	Remove the bottom plate from the display unit.
2	Make the connections shown in Fig. 1. (Do not place the MRTS display unit on the sending unit)
3	Turn on the POWER (1) switch.
4	Set the CAL OUTPUT (43) switch on the rear panel to ON.
5	Check that the CAL OUTPUT (14) frequency is within 50 ±1MHz. If it is out of this range, adjust it with the FREQ ADJ (L1) at the bottom of display unit.
6	Change the connections to the arrangement shown in Fig. 2.
7	Push ZERO SET (12) before connecting the RF power head to 435A-K06 frequency power refernce.
8	Connecting the RF power head to 435A-K06 FREQUENCY POWER REFERENCE and set the CORRECTION FACTOR dB (15).
9	Perform the calibration by using CAL (13).
10	Connect the RF power head to the CAL OUTPUT dBm (14).
11	Check the CAL OUTPUT (14) level.
12	Make sure the cal output level is 0.00dBm, adjusting it at the Cal Output Level ADJ (R4) installed at the bottom of the displaying unit.
13	Turn off the CAL OUTPUT (43) switch on the rear panel.
14	Turn off the POWER (1) switch.
15	Replace the bottom plate.

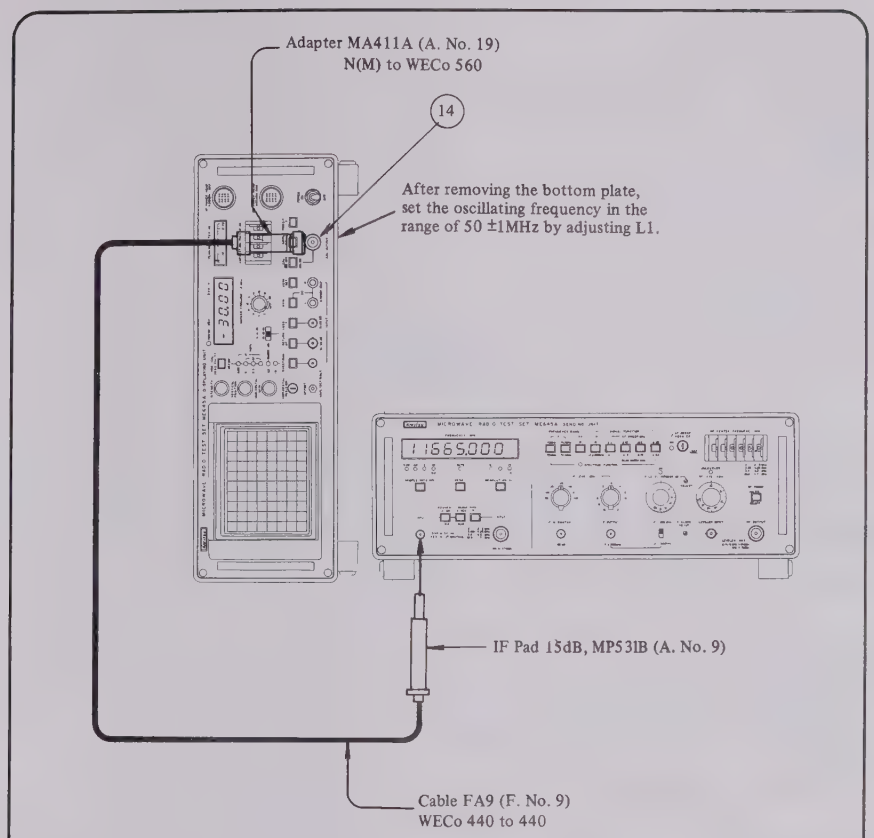

Adapter MA411A (A. No. 19)
N(M) to WECo 560
14
After removing the bottom plate,
set the oscillating frequency in the
range of 50 ±1MHz by adjusting L1.
IF Pad 15dB, MP53IB (A. No. 9)
Cable FA9 (F. No. 9)
WECo 440 to 440

Fig. 1–CAL OUTPUT Frequency Calibration Connections

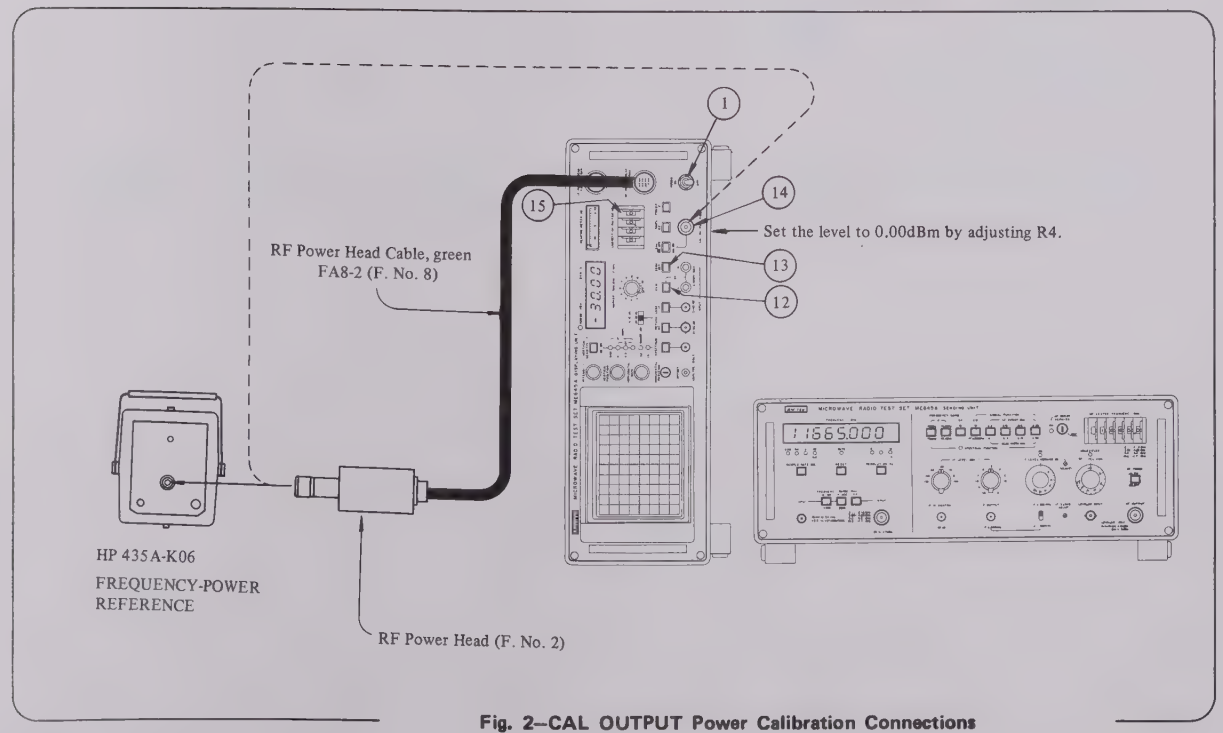


Fig. 2–CAL OUTPUT Power Calibration Connections

B. Accuracy and Vertical Sensitivity Check

2.03 These are checked after the calibration described in item A is completed.
Allow 30 minutes or longer for MRTS before this check.

2.04 *Check Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 3.
2	Set the output level of MG545K (Synthesized Signal Generator) to +10dBm and the frequency to 50MHz.
3	Set the coaxial switch to the 435A Power Meter side.
4	Set the value of the calibrated attenuator so that the specific values (0dBm, –10dBm, and –30dBm) can be read on the 435A Power Meter.
5	Set the coaxial switch to the ME645A MRTS side.
6	Set CORRECTION FACTOR dB (15) and read the input power level.
7	The difference between the power indication on the 435A Power Meter and that on the MRTS is normally within ±0.2dB. (Accuracy check ends.)
8	Set VERTICAL (Coupling) (41) (rear panel) to DC.
9	Change the attenuation of the calibrated attenuator and read the vertical displacement of the trace line on the CRT screen.
10	Determine the variation of the input power from both the VERTICAL SENSITIVITY (6) and the displacement of the trace line, and compare it with that of the attenuator. (Vertical sensitivity check ends.)

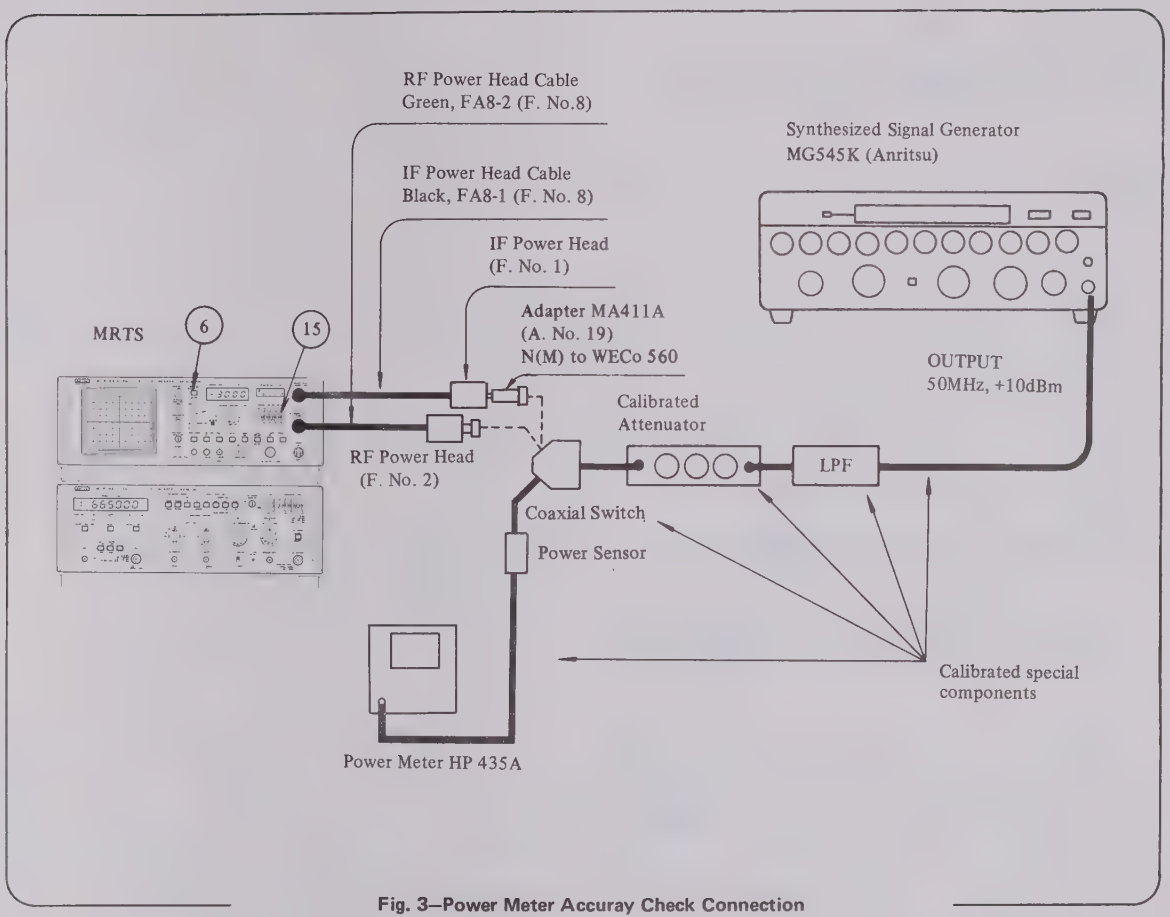


Fig. 3—Power Meter Accuray Check Connection

3. FREQUENCY COUNTER

A. Time Base Oscillator Calibration

3.01 The frequency of the time base oscillator is an important factor upon which measuring accuracy depends.

3.02 *Calibration Procedure:*

STEP	PROCEDURE
1	Allow 5 hours warm-up time before Performing MRTS adjustment.
2	Make the connections shown in Fig. 4.
3	Adjust TIME BASE ADJUST (92) for minimum sideways movement of the 10MHz displayed signal.
4	By timing the sideways movement (in cm par second), the offset can be determined based on the oscilloscope sweep speed as shown in the following:

MOVEMENT	SWEEP SPEED			NOTES
	1μs/cm	0.1μs/cm	0.01μs/cm	
1cm/s	1×10^{-6}	1×10^{-7}	1×10^{-8}	TIME SCOPE TRACE MOVEMENT
1cm/10s	1×10^{-7}	1×10^{-8}	1×10^{-9}	WITH SECOND HAND OF
1cm/100s	1×10^{-8}	1×10^{-9}	1×10^{-10}	WATCH OR CLOCK

For example, if the trace moves 1 centimeter in 10 seconds and the sweep speed is 0.01μs/cm, the oscillator signal is within 1×10^{-9} of the reference frequency.

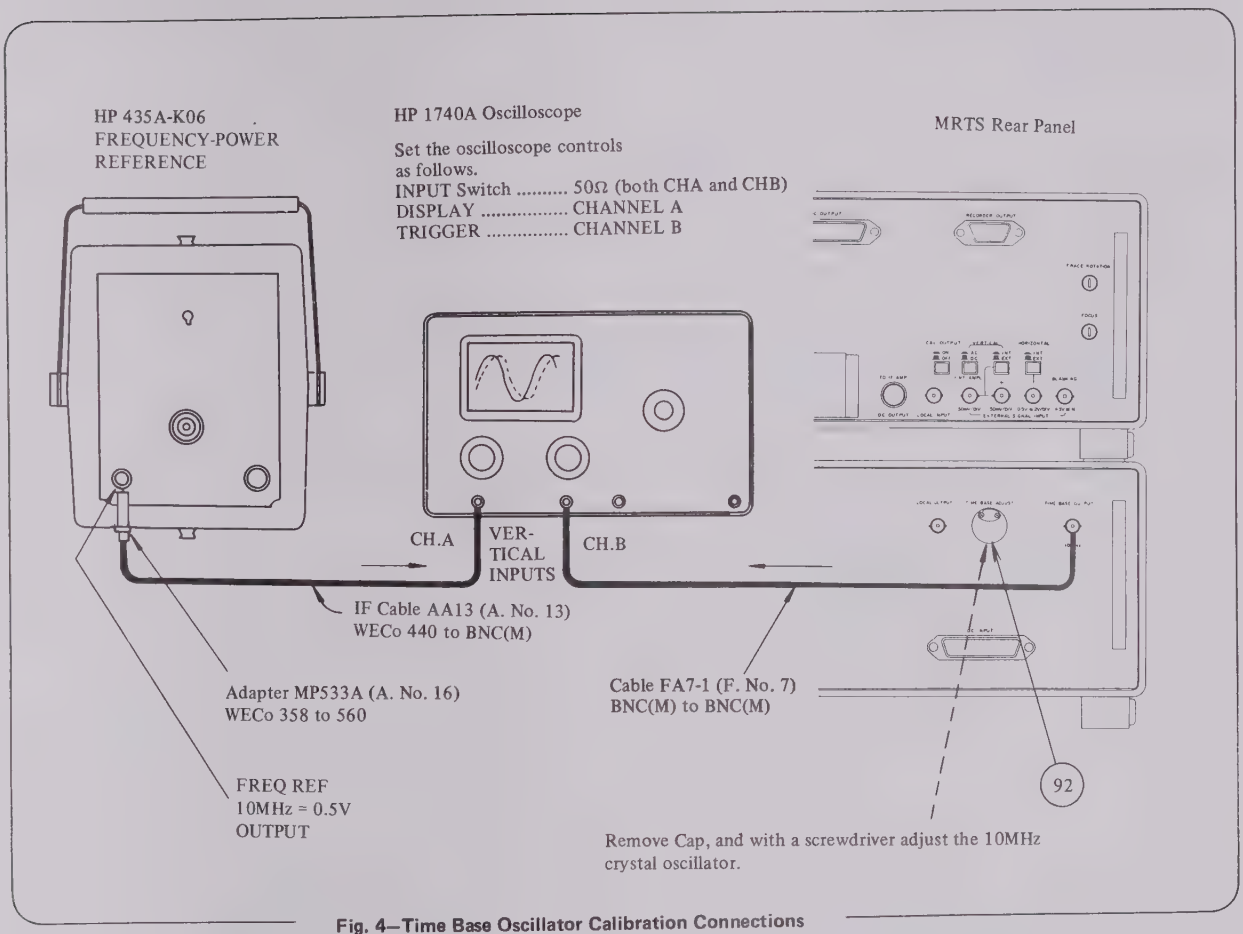


Fig. 4—Time Base Oscillator Calibration Connections

B. Minimum Input Level Check

3.03 Refer to Section 2, item 4 (Frequency Counter Troubleshooting and Repair).

4. IF SWEEP GENERATOR

A. Frequency (CW Mode) Check

4.01 *Check Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 5.
2	Set FREQUENCY BAND (68) to 70MHz or 74.1MHz.
3	Push CW (69).
4	Measure the frequency of the IF output signal by the calibrated standard MRTS. The normal values are as follows: 70MHz: 70MHz ±1.4kHz 74.1MHz: 74.1MHz ±1.48kHz

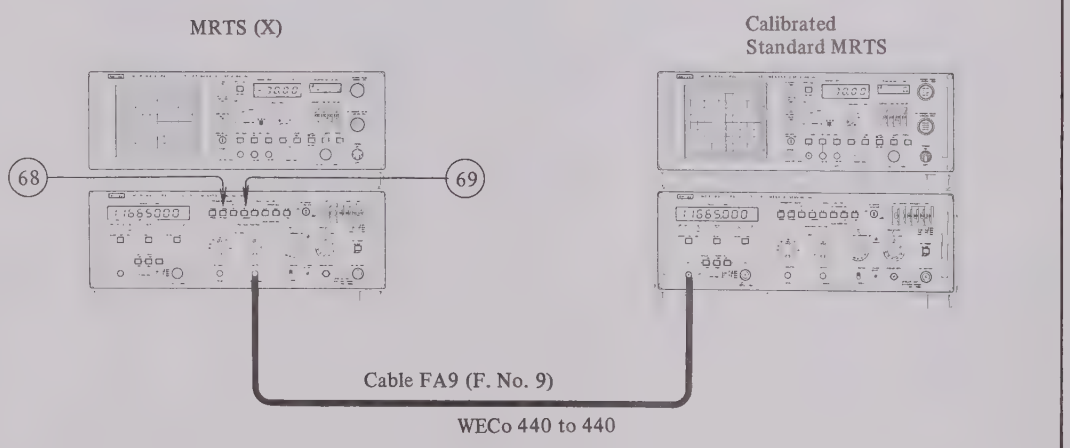


Fig. 5—Frequency Check Connection

B. **Sweep Width Check**

4.02 *Check Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 6.
2	Set FREQUENCY BAND (68) to 70MHz or 74.1MHz.
3	Set ΔF SWEEP WIDTH (70) to any one of ±2MHz, ±10MHz, ±15MHz, and ±20MHz and ΔF SWEEP VERNIER (71) to REF.
4	Set the IF level output to +10dBm.
5	Set the oscillation frequency of MG545K within the band set in Step 3.
6	The birdie marker set by MG544K appears on the CRT screen of the calibrated standard MRTS.
7	While adjusting the output level of MG545K, set the birdie marker to the easy-to-see size.
8	Adjust MG545K frequency and set the birdie marker to the left end (Point (A) of Fig. 6) on the CRT screen.
9	Read the MG545K frequency value.
10	Adjust the MG545K frequency and set the birdie marker to the right end (Point (B) of Fig. 6) on the CRT screen.
11	Read the MG545K frequency value.
12	The MG545K frequency value of Steps 9 and 11 are correspond to the lowest and highest frequencies of the swept IF signal respectively.

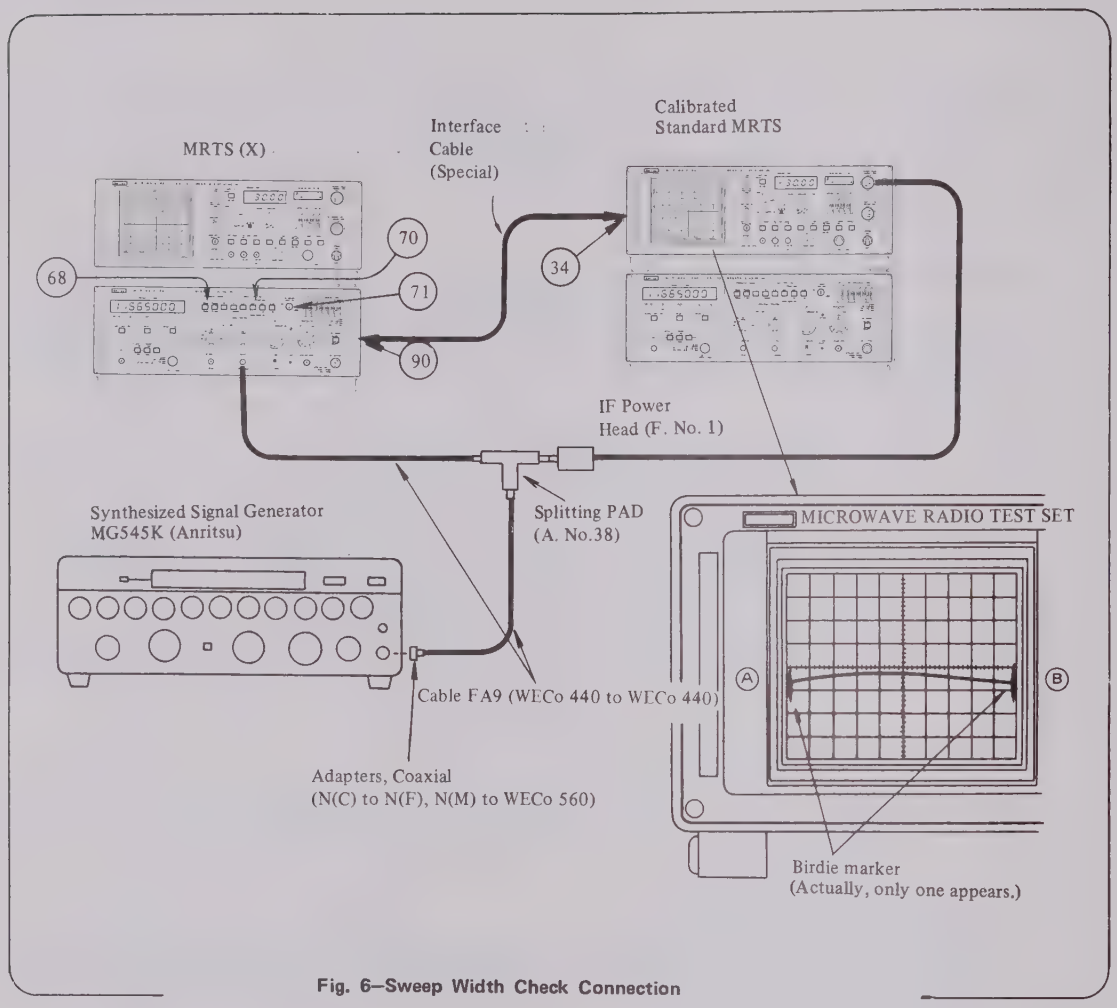


Fig. 6–Sweep Width Check Connection

C. Power Output/Power Output Flatness Calibration

4.03 *Power Output Adjustment Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 7.
2	Set FREQUENCY BAND (68) to 70MHz or 74.1MHz.
3	Push CW (69).
4	Set IF VERNIER (64) to extreme clockwise position.
5	Check that IF power output is within ±0.5dB of the setting level by the IF LEVEL dBm (63).
6	When the IF output level is not within ±0.5dB, adjust the IF level by using IF LEVEL VERNIER ADJUST (81).

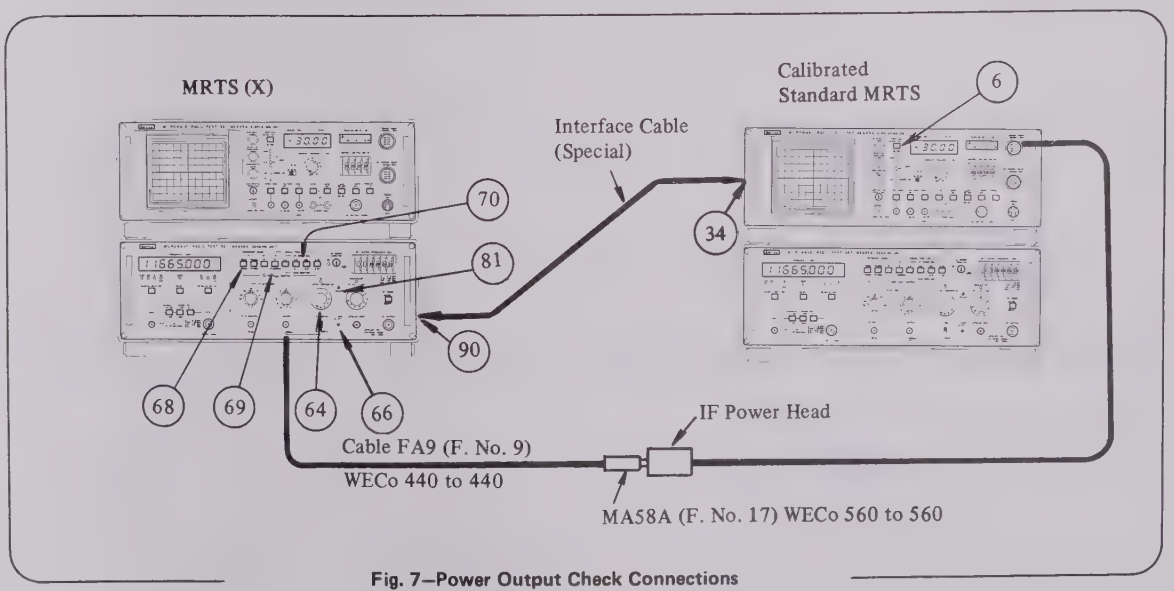


Fig. 7—Power Output Check Connections

4.04 *Power Output Flatness Adjustment Procedure:* The following procedure is performed after the power output adjustment.

STEP	PROCEDURE
1	Set the IF level to 0dBm.
2	Set ΔF SWEEP WIDTH (70) to 20MHz.
3	Set the VERTICAL SENSITIVITY (6) of the calibrated standard MRTS to 0.05dB/div.
4	Adjust using IF SLOPE ADJUST (66) so that the slope on the CRT screen of the calibrated standard MRTS becomes flat.

5. RF SWEEP GENERATOR

A. Frequency (CW Mode) Check

5.01 *Check Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 8.
2	Push RF (72), CW (69) and RF POWER (76) to ON.
3	Check the output signal frequency with a frequency counter after setting RF CENTER FREQUENCY (78). The normal values are as follows. 3.65 – 4.25GHz (±40kHz) 5.8 – 6.5GHz (±60kHz) 10.6 – 11.7GHz (±110kHz) (Option 001) 2.11 – 2.18GHz (±20kHz) (Option 003)

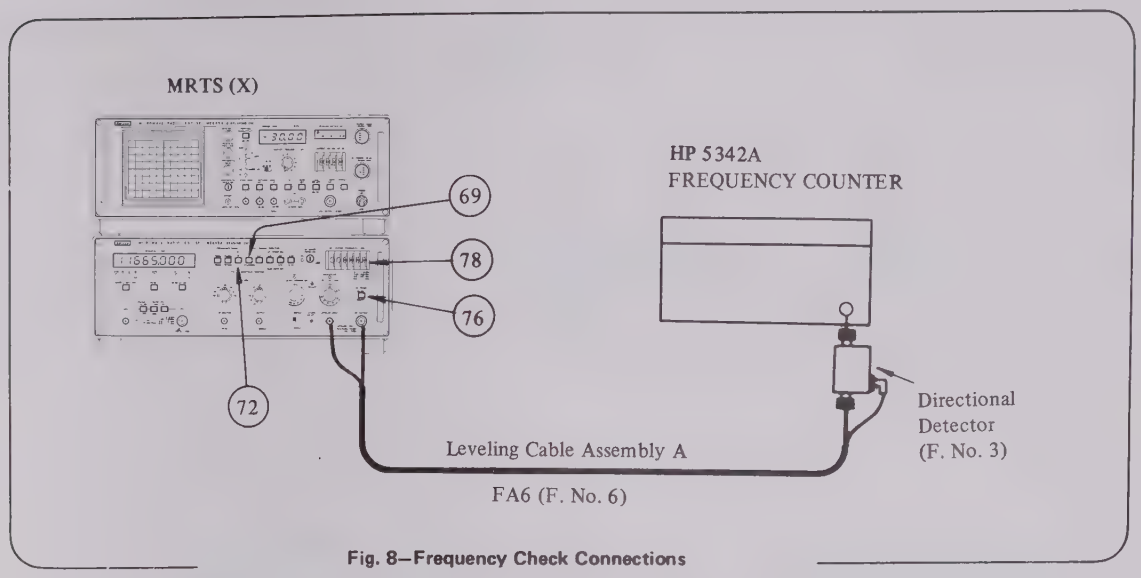


Fig. 8—Frequency Check Connections

B. Power Output/Power Output Flatness Check

5.02 *Check Procedure:*

STEP	PROCEDURE
1	Connect as shown in Fig. 9.
2	Push RF (72) and ±20MHz (70).
3	Set the VERTICAL SENSITIVITY (6) of the calibrated standard MRTS to 0.1dB/div and VERTICAL (Coupling) (41) (rear panel) to AC.
4	While rotating RF LEVEL dBm (73), measure the RF output level and flatness where the UNLEVELED (74) lamp does not light using the calibrated standard MRTS.
5	The following level range can be adjusted by RF LEVEL dBm (73), and output level measurement function is normal. 4/6GHz bands : 0 to +10dBm 11GHz band : 0 to +5dBm (Option 001) 2GHz band : 0 to +10dBm (Option 003)

STEP	PROCEDURE

6 The normal power output flatness are as follows.

4GHz band : Less than ±0.025dB/(±10MHz, 0 to +10dBm)
6GHz band : Less than ±0.025dB/(±20MHz, 0 to +10dBm)
11GHz band : Less than ±0.05dB/(±20MHz, 0 to +5dBm)
2GHz band : Less than ±0.025dB/(±10MHz, 0 to +10dBm)

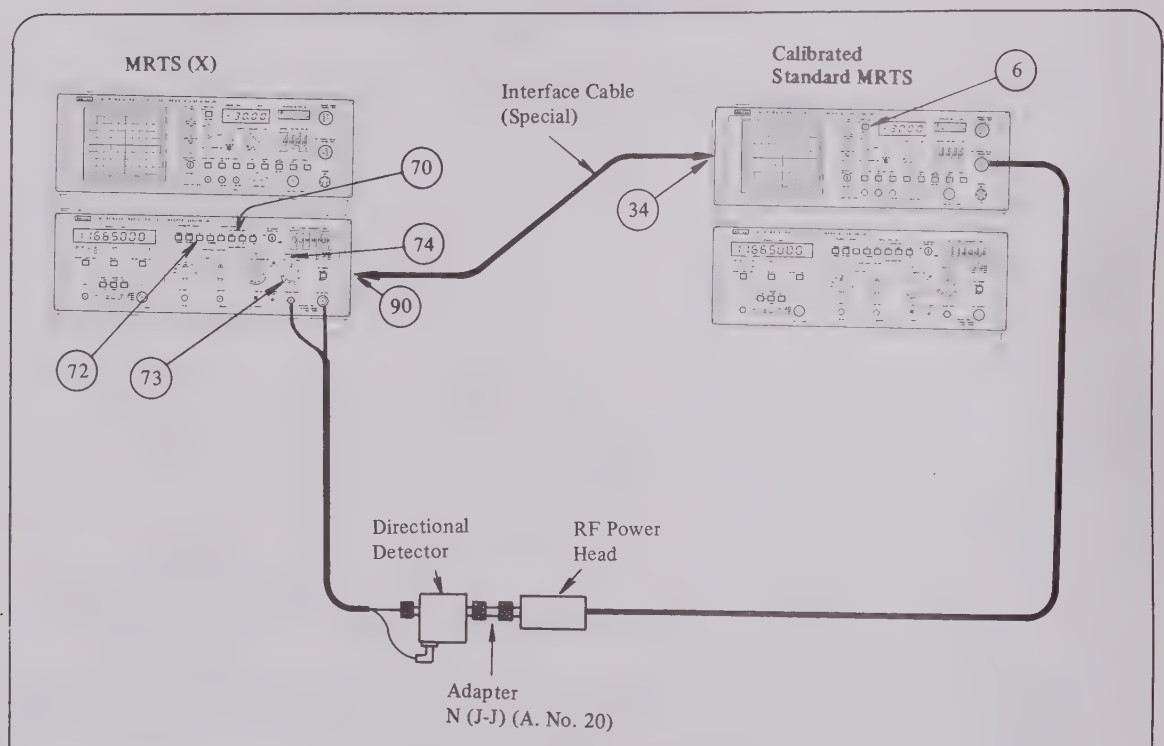
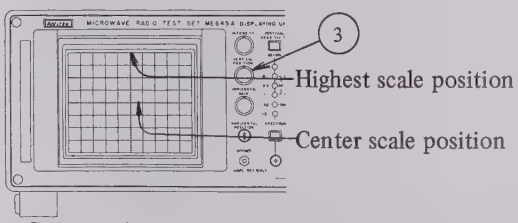


Fig. 9—Output Level Check Connections

6. CRT SECTION

A. Vertical Sensitivity Calibration Procedure

6.01 *Calibration Procedure:*

STEP	PROCEDURE
1	Remove MRTS display unit's exterior cover.
2	Make the connections shown in Fig. 10. (Connect the tip of calbe BNC(M) to the alligator clip as shown at *1 in Fig. 10)
3	Turn on all power switches.
4	Set the power supply output voltage so that the digital voltmeter specifies +0.200V.
5	Set the HORIZONTAL (39) (rear panel) to INT.
6	Set the VERTICAL (41) (rear panel) to EXT.
7	Set the trace line on the CRT center scale position by using the VERTICAL POSITION (3). *Note:* The highest and the center CRT scale positions are shown below. 
8	Connect the core-side alligator clip as shown at *2 in Fig. 10 to the Power Supply's ⊕ terminal and connect the exterior cover clip to the Power Supply's ⊖ terminal.
9	The trace line should move to the highest CRT scale position.
10	If the bright line is either lower or higher than the this highest position, adjust it by turning the VERT GAIN R15 at PC board Z3 (left side of displaying unit).

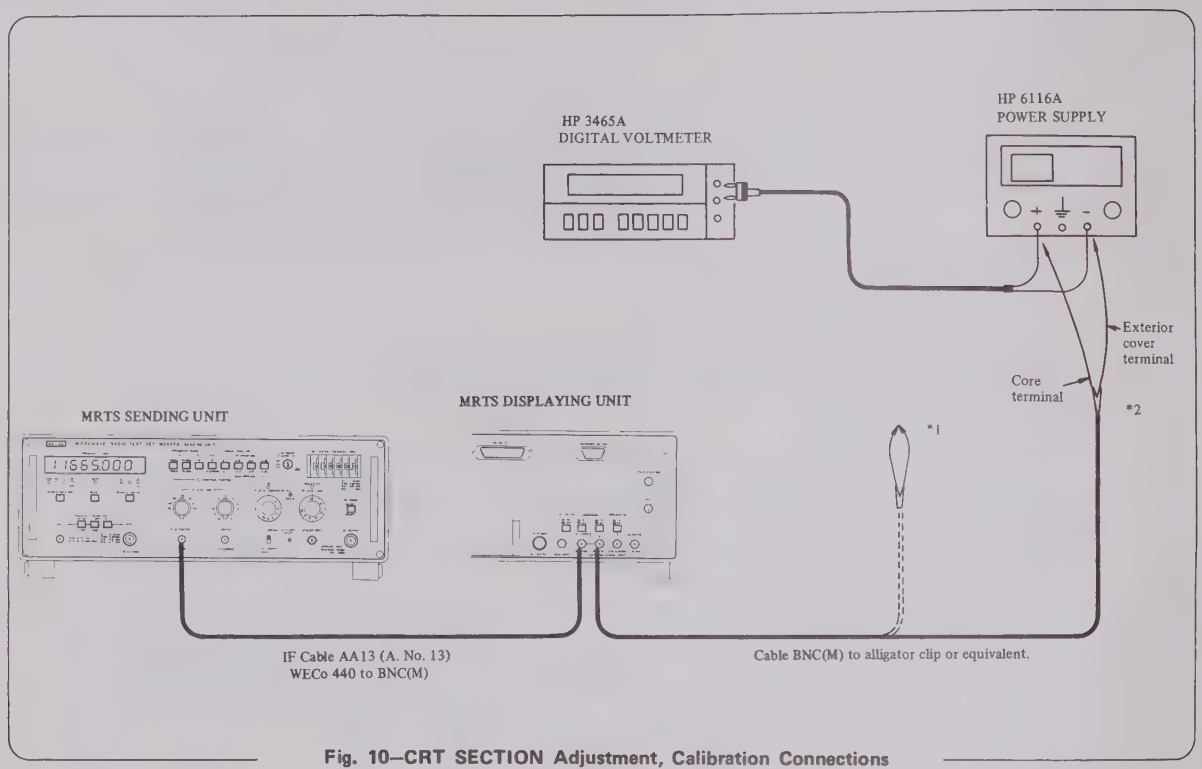


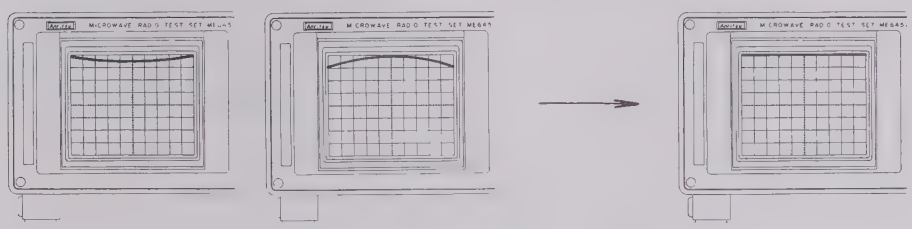
Fig. 10—CRT SECTION Adjustment, Calibration Connections

B. Geometry Focus Astigmatism, Trace Rotation Adjustment Procedure

Danger: The following adjustments are for a high voltage bias. Use an insulated screwdriver.

6.02 *Adjustment Procedure*

STEP	PROCEDURE
1	Perform steps 1 through 10, in item 6.01.
2	The trace line should be at the highest scale position.
3	If the trace line is distorted, adjust the geometry R86 (PC Board Z3).



Before adjustment
(Trace line is curved)

After adjustment
(Trace line is straight)

4	Remove the alligator clips from the power supply as shown in Fig. 10.
5	Short the alligator clip tip as shown at *1 in Fig. 10.
6	The trace line should be at the center CRT scale position.
7	If the trace line is out of focus, adjust the FOCUS (37) and astigmatism R87 (PC Board Z3).

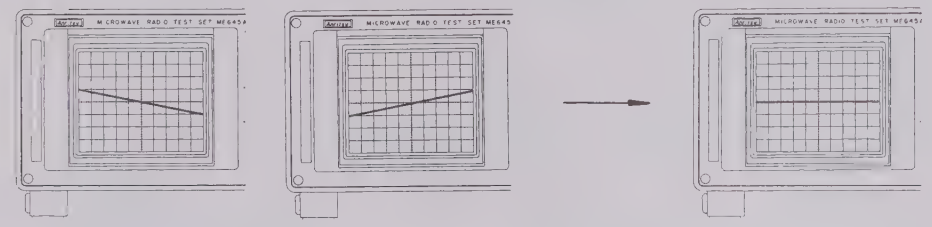
Before adjustment
(Trace line out of focus)

After adjustment
(Trace line focused)

STEP	PROCEDURE

Note: Focus at the four corners of the CRT screen is not as clear as at the screen's center. Therefore, the focus astigmatism to must be adjusted, on condition that the trace line set at the center of the CRT screen.

8 If the trace line is sloped, adjust the TRACE ROTATION (36).



Before adjustment
(Trace line is sloped)

After adjustment
(Trace line is horizontal)

7. DIGITAL VOLTMETER

7.01 *Calibration*: Measure a known output voltage of the DC Power Supply by the MRTS and compare it to the indication on the Digital Voltmeter. (Fig. 11)

7.02 *Adjustment Procedure:*

STEP	PROCEDURE

1 Short between input terminals H and L, and make sure that the indication becomes ±0.0 volt. If the indication is not ±0.0 volt, repair is needed. See Section 2, item 5, D Digital Voltmeter Troubleshooting.

2 Connect as shown in Fig. 11. Set input voltage at +100.0V. Adjust R11 of Z7 to obtain a +100.0 indication.

3 Connect L input terminal to the ground and H input terminal to the voltage +100.0V above the ground voltage. Adjust R10 of Z7 to obtain a +100.0 indication.

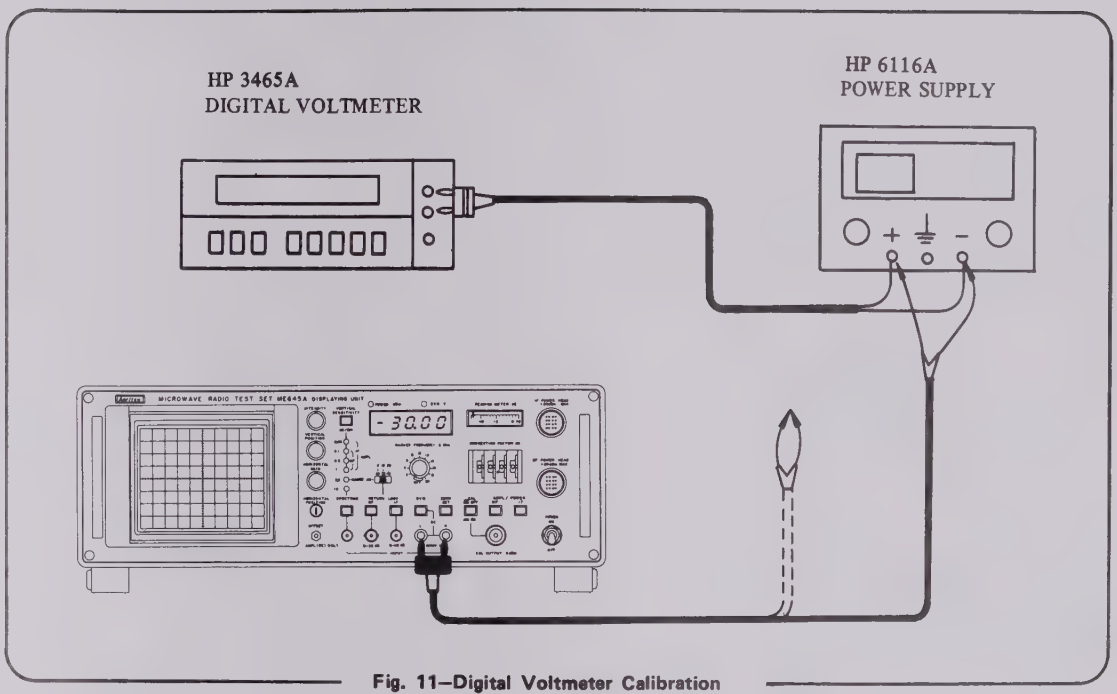


Fig. 11–Digital Voltmeter Calibration

SECTION 2

TROUBLESHOOTING AND REPAIR

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1. INTRODUCTION

1.01 Troubleshooting and repair when trouble occurs during measurement, or when an abnormal condition is detected during the Calibration of SECTION 1 Back-to-Back test of Section 2, item 3 in the separate OPERATION MANUAL is described in this section.
Each section contains the following three paragraphs:

(a) Circuit Description: Describes the operating circuits.

(b) Troubleshooting: Contains the troubleshooting flow chart to facilitate finding faulty circuits.

(c) Circuit Diagram: Contains the circuit diagrams and component locations. These include voltages and waveforms at the test points.

Note 1: Replace P.C. boards as necessary.
Soldering is not required for P.C. board replacement in this test set.

Note 2: After extending each PC board check for the waves and voltages of PC boards Z4, Z5, Z6, Z7, Z15, Z16, and Z17 for displaying units using the card extenter incorporated in the displaying unit.
Also check for the sending units Z1, Z2, Z3, and Z4 using the card extender incorporated in the sending unit.

A. Check Procedure

1.02 General troubleshooting and repair procedures are as follows:

(a) Detection of unusual operation
(b) Rough estimation of error locations
(c) Checking and detection of error locations
(d) Checking for causes
(e) Countermeasures.

1.03 If a malfunction is detected, check for error locations to avoid a determination error after performing procedures outlined in Section 1, "Calibration and Adjustment of the Service Manual", or Section 2, item 3, "Back-to-Back test of the Operation Manual". The relationship between unexecutable procedure contents and paragraphs referred to is shown in Table A. Use this table to estimate error locations.

Table A—Unexecutable Procedure Contents and Paragraphs to be Referred to

Unexecutable procedure contents (paragraph) OP: Operation Manual, SE: Service Manual	Paragraph referred to
Related to all functions	Item 6 : POWER SUPPLY
CRT Display Check (OP : Section 2, item 3, C) CRT Section Calibration (SE : Section 1, item 6)	Item 6 : CRT CIRCUIT
RF Power Meter Check (OP : Section 2, item 3, D) IF Power Meter Check (OP : Section 2, item 3, E) Power Meter Calibration (SE : Section 1, item 2)	Item 5 : POWER METER Item 7 : Y OFFSET
Frequency Counter Calibration (SE : Section 1, item 3) Frequency Counter Check (OP : Section 2, item 3, F)	Item 4 : FREQUENCY COUNTER
IF Amplitude Response and IF Power Output Check (OP : Section 2, item 3, G)	Item 2 : IF SWEEP GENERATOR Item 5 : POWER METER Item 6 : CRT CIRCUIT Item 7 : Y OFFSET
IF Return Loss Circuit Check (OP : Section 2, item 3, H)	Item 2 : IF SWEEP GENERATOR Item 6 : CRT CIRCUIT Item 7 : Y OFFSET, RETURN LOSS
IF Frequency Check (OP : Section 2, item 3, I)	Item 2 : IF SWEEP GENERATOR Item 4 : FREQUENCY COUNTER
IF Sweep Generator Calibration (SE : Section 1, item 4)	Item 2 : IF SWEEP GENERATOR
RF Sweep Generator Calibration (SE : Section 1, item 5)	Item 3 : RF SWEEP GENERATOR
RF Power Output Level Check (OP : Section 2, item 3, J) RF Amplitude Response Check (OP : Section 2, item 3, K)	Item 3 : RF SWEEP GENERATOR Item 4 : POWER METER Item 6 : CRT CIRCUIT Item 7 : Y OFFSET
RF Return Loss Circuit Check (OP : Section 2, item 3, L)	Item 3 : RF SWEEP GENERATOR Item 6 : CRT CIRCUIT Item 7 : Y OFFSET, RETURN LOSS
Spectrum Function Check (OP : Section 2, item 3, N)	Item 2 : IF SWEEP GENERATOR Item 6 : CRT CIRCUIT Item 7 : Y OFFSET, SPECTRUM FUNCTION
Digital Voltmeter Calibration (SE : Section 1, item 7)	Item 5 : DIGITAL VOLTMETER

2. IF SWEEP GENERATOR

A. Circuit Description

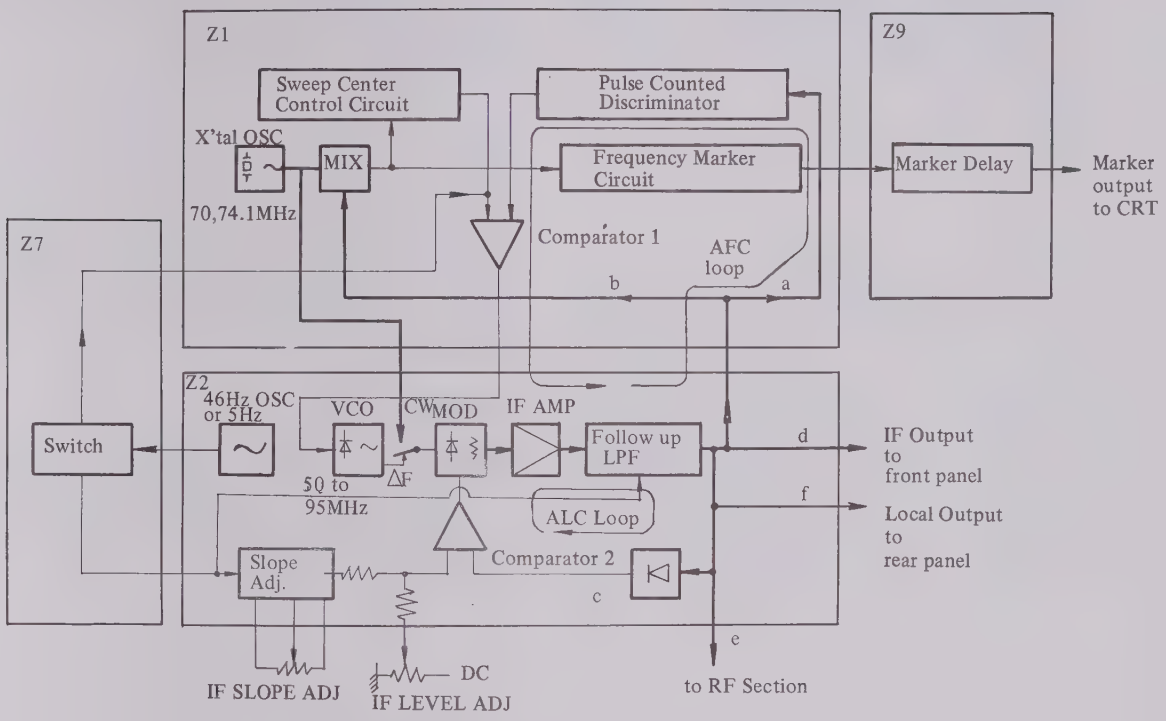


Fig. 1—IF Sweep Generator Block Diagram

SWEEP (ΔF) Mode

2.01 The Voltage Control Oscillator (VCO) of Z2 oscillates frequencies over the 50 to 95MHz frequency range. The VCO output is branched to six signals through the follow-up LPF (Note). These signals are (a) Automatic Frequency Control (AFC), (b) frequency marker, (c) Automatic Level Control (ALC), (d) IF output, (e) RF control, and (f) Local Output.

2.02 *AFC Signal:* An AFC loop is formed by feeding this signal back to the frequency control terminal of the VCO thru the Pulse Counted Discriminator (PCD) and a comparator. The PCD output, the 46Hz sweep rate signal, and the output from the sweep center control circuit are applied to comparator 1. Therefore, this loop improves the sweep linearity and stabilize the center frequency.

2.03 *Frequency Marker Signal:* The output of the crystal oscillator and its mixed output (difference frequency signal) are applied to the FREQUENCY MARKER CIRCUIT. The frequency marker that indicates the sweep width has an accuracy of $\pm 2 \times 10^{-5}$. The marker is sent to the displaying unit through the Z9 Marker Delay circuit. The Z9 Marker Delay circuit uses a digital delay circuit.

2.04 *ALC Signal:* An ALC loop is formed by feeding this signal back to the modulator through the detector and comparator 2. DC and 46Hz sweep rate signals are input at comparator 2. Therefore, IF power output continuous level adjustment (10dB) and IF slope adjustment are possible.

2.05 *IF Output Signal:* This signal is sent to the front panel IF OUTPUT terminal.

2.06 *RF Control Signal:* This signal is sent to the phase detector of the RF sweep generator and used as the PLL reference signal to improve RF sweep linearity and frequency stability.

2.07 *Local Output:* This signal is sent to the rear panel LOCAL OUTPUT terminal and used as the local signal for spectrum function. Here, this signal is controlled in the 38 to 106MHz range by the VCO.

(a) Since the swept signal frequency varies 50 to 95 MHz, the LPF cutoff frequency changes in sync with the sweep.

(b) Sweep Center Control Circuit

This circuit accurately controls the center frequency of the frequency swept oscillator, using a fixed frequency oscillator. Its principle of operation is shown in Fig. 2.

The Q, $\overline{Q}$ signals are obtained by driving a D type flipflop with a trigger signal obtained by mixing the frequency swept IF signal and the crystal controlled standard oscillator signal. When the center frequency of the swept signal is different from the frequency of the standard oscillator, an error is generated between the time of trace triggering to retrace triggering and the time of retrace triggering to trace triggering. Since this error causes a difference in the pulse width of Q and $\overline{Q}$, it is detected and used to control the VCO center frequency.

2.08 *Frequency Marker Circuit:* This circuit generates the fixed center frequency marker (70 or 74.1MHz) and the side marker incremented in 1MHz steps.

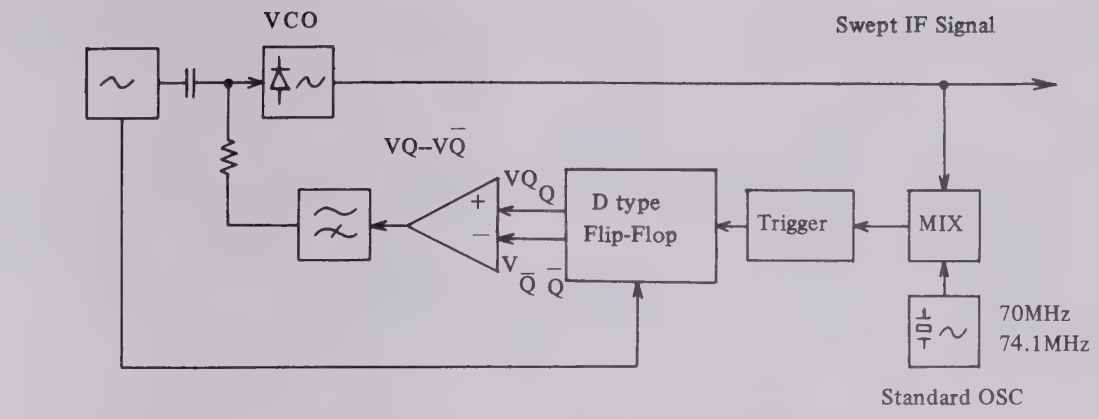
The block diagram is shown in Fig. 3.

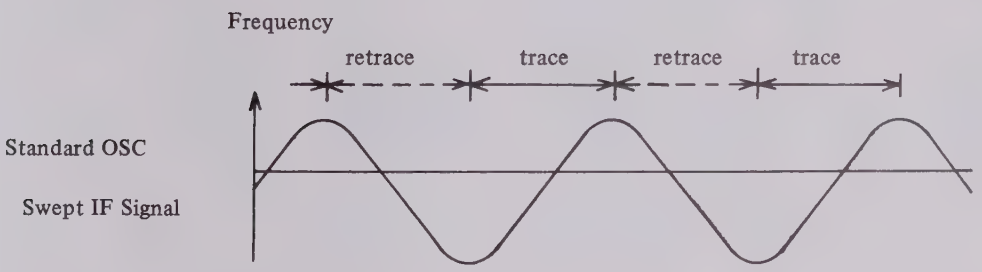
The GATE(A) for turning the 1MHz signal ON or OFF turns ON when the DC voltage (Vm) set by the Displaying Unit MARKER FREQUENCY dial and the SWEEP RATE OSC output signal (Vs) are equal. The 1MHz signal passing through this GATE is mixed with the IF signal which was reduced to the 0 to ±20MHz swept signal with MIXER-1 by using HARMONIC MIXER-2. The zero beat is removed from this MIXER output and combined with the Center Marker zero beat. Then, it is displayed on the CRT as in (2) of Fig. 3.

CW Mode

2.09 The output of the crystal oscillators (70 and 74.1 MHz) of Z1 is applied to ALC loop of Z2 and sent to the front panel IF OUTPUT terminal.

Frequency accuracy is 2×10^{-5}.





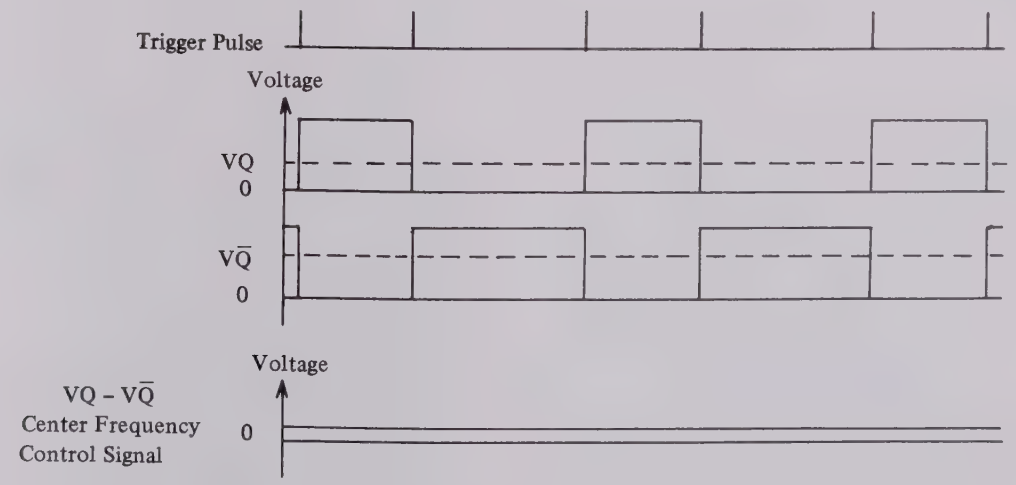
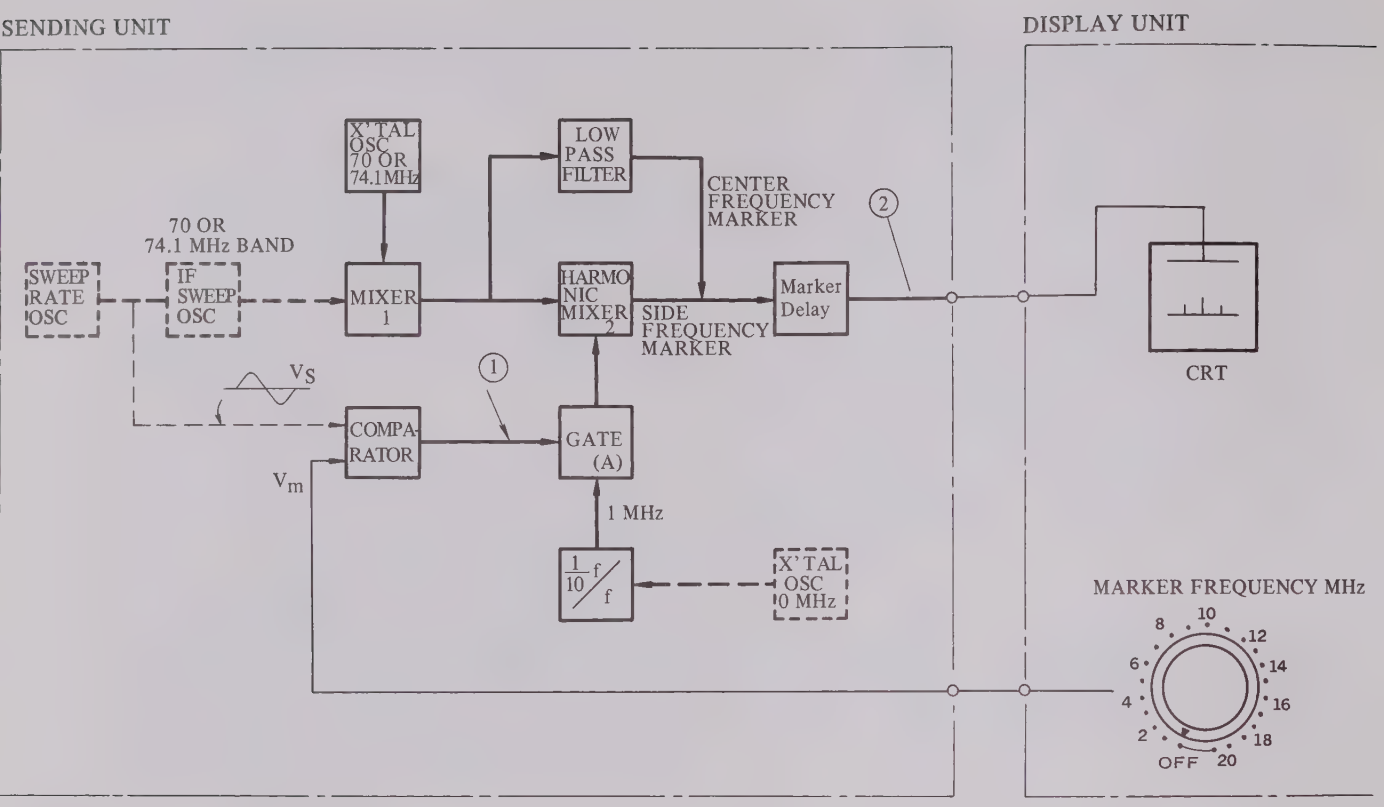


Fig. 2—Sweep Center Control Circuit Block Diagram & Time Chart



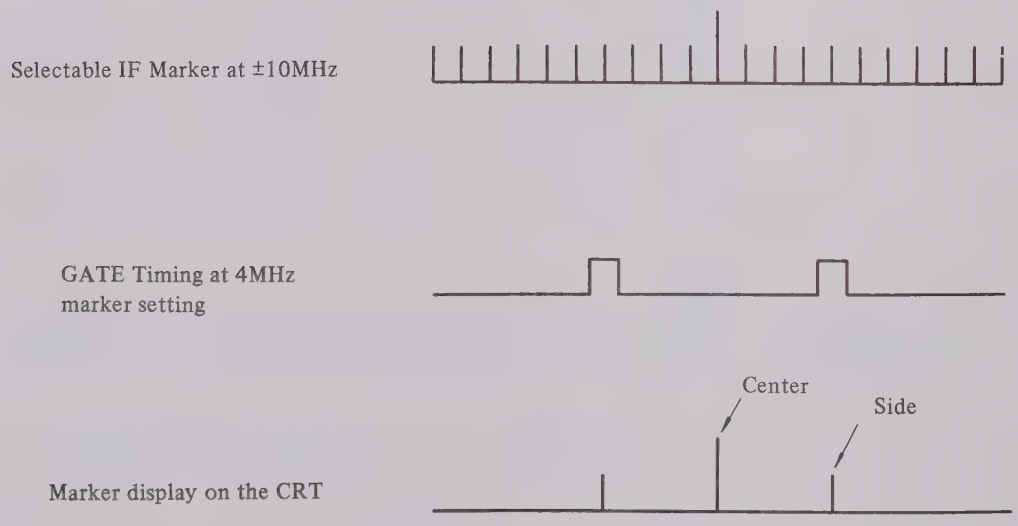


Fig. 3—Frequency Marker Block Diagram & Time Chart

B. IF Sweep Generator Troubleshooting

2.10 This paragraph describes the method of isolating the P.C. board in which trouble has occurred. Determine the defective board or part by the flow chart in Fig. 4.

(a) Set the controls as follows:

(1) IF LEVEL VERNIER (64) ADJUST to extreme clockwise position.

(2) IF LEVEL dBm (63) to +10dBm.

(b) Push the 70MHz or 74.1MHz switch and the CW switch.

(c) Check the IF OUTPUT output level (+10 ±0.5dBm).

(1) Check the crystal oscillator section of Z1.
(2) Check the IF AMP section of Z2.

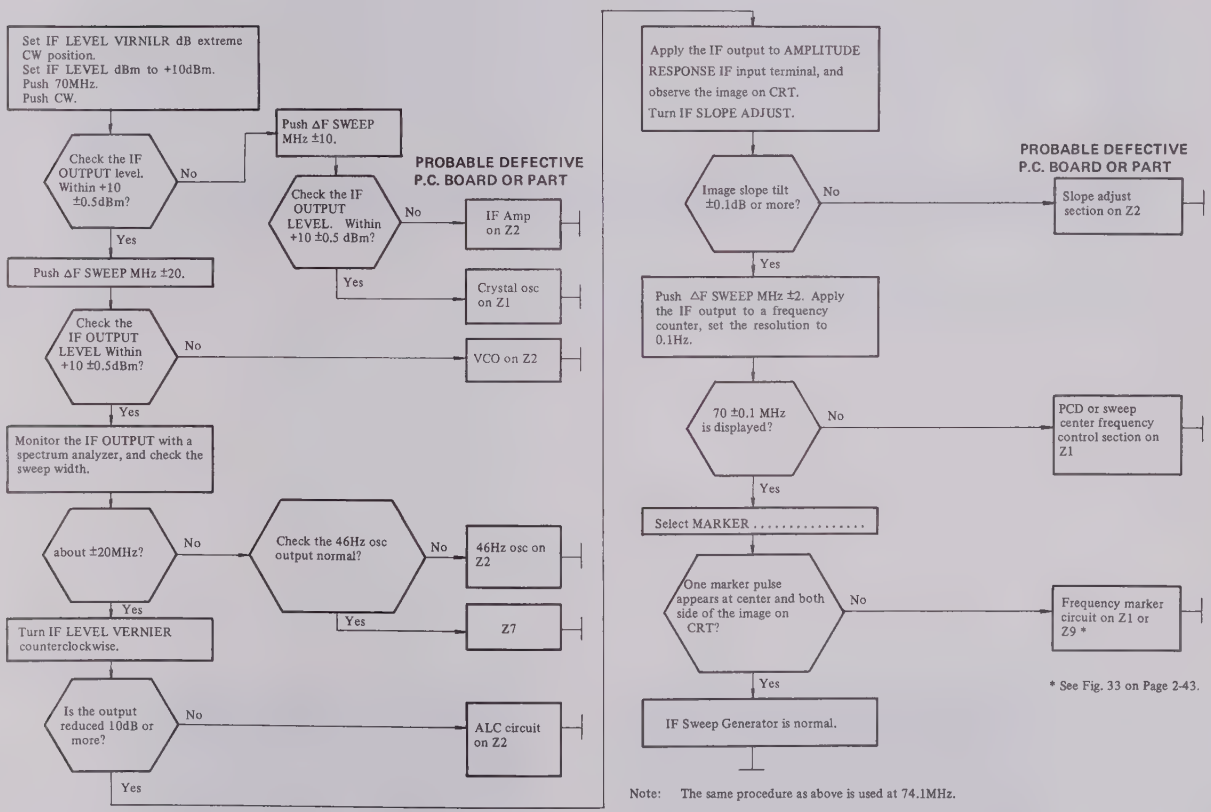

Set IF LEVEL VIRNILR dB extreme CW position.
Set IF LEVEL dBm to +10dBm.
Push 70MHz.
Push CW.
Check the IF OUTPUT level. Within +10 ±0.5dBm?
No
Push ΔF SWEEP MHz ±10.
Check the IF OUTPUT LEVEL. Within +10 ±0.5 dBm?
No
IF Amp on Z2
Yes
Crystal osc on Z1
Yes
Push ΔF SWEEP MHz ±20.
Check the IF OUTPUT LEVEL Within +10 ±0.5dBm?
No
VCO on Z2
Yes
Monitor the IF OUTPUT with a spectrum analyzer, and check the sweep width.
about ±20MHz?
No
Check the 46Hz osc output normal?
No
46Hz osc on Z2
Yes
Z7
Yes
Turn IF LEVEL VERNIER counterclockwise.
Is the output reduced 10dB or more?
No
ALC circuit on Z2
Yes
PROBABLE DEFECTIVE P.C. BOARD OR PART
Apply the IF output to AMPLITUDE RESPONSE IF input terminal, and observe the image on CRT.
Turn IF SLOPE ADJUST.
Image slope tilt ±0.1dB or more?
No
Slope adjust section on Z2
Yes
Push ΔF SWEEP MHz ±2. Apply the IF output to a frequency counter, set the resolution to 0.1Hz.
70 ±0.1 MHz is displayed?
No
PCD or sweep center frequency control section on Z1
Yes
Select MARKER .....
One marker pulse appears at center and both side of the image on CRT?
No
Frequency marker circuit on Z1 or Z9 *
Yes
IF Sweep Generator is normal.
PROBABLE DEFECTIVE P.C. BOARD OR PART
* See Fig. 33 on Page 2-43.
Note: The same procedure as above is used at 74.1MHz.

Fig. 4—IF Sweep Generator Troubleshooting Flow Chart

Z7 SWITCH BOARD

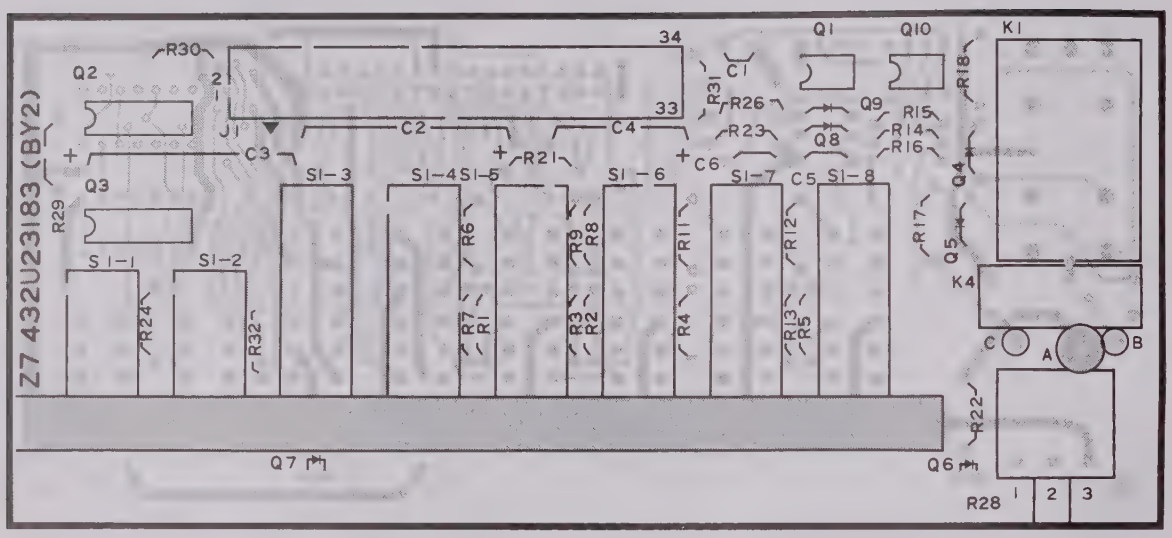
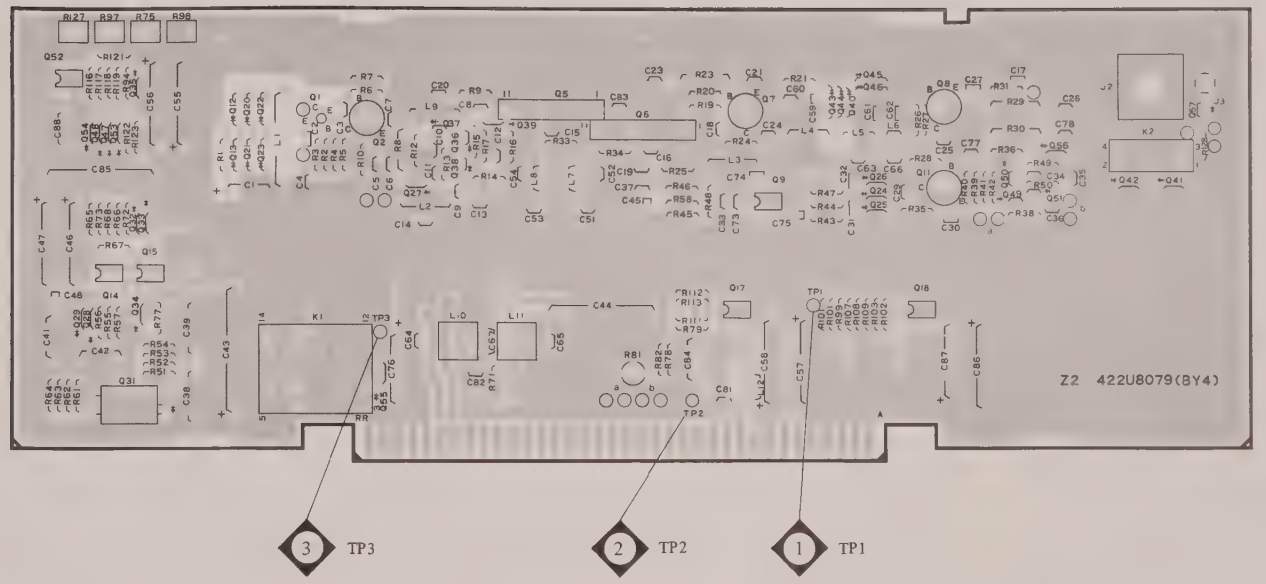


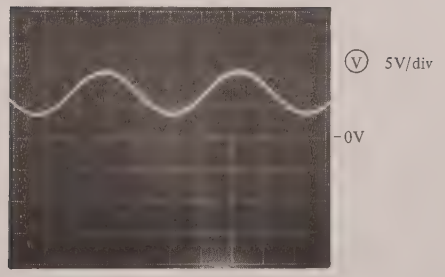
Fig. 5—IF Sweep Generator Test Point

Z2 IF OSC and AMP



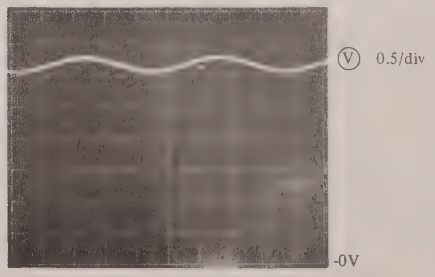
TP1

CENTER FREQUENCY 70MHz
ΔF SWEEP ±20MHz

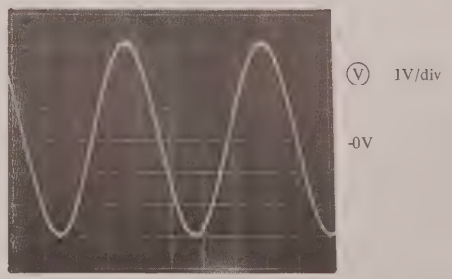


TP2

CENTER FREQUENCY 70MHz
ΔF SWEEP ±20MHz
SLOOP ADJ fully counterclockwise



TP3
SPECTRUM OFF



TP3
SPECTRUM ON

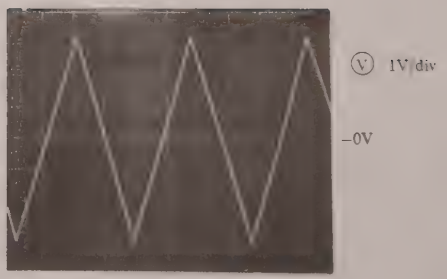
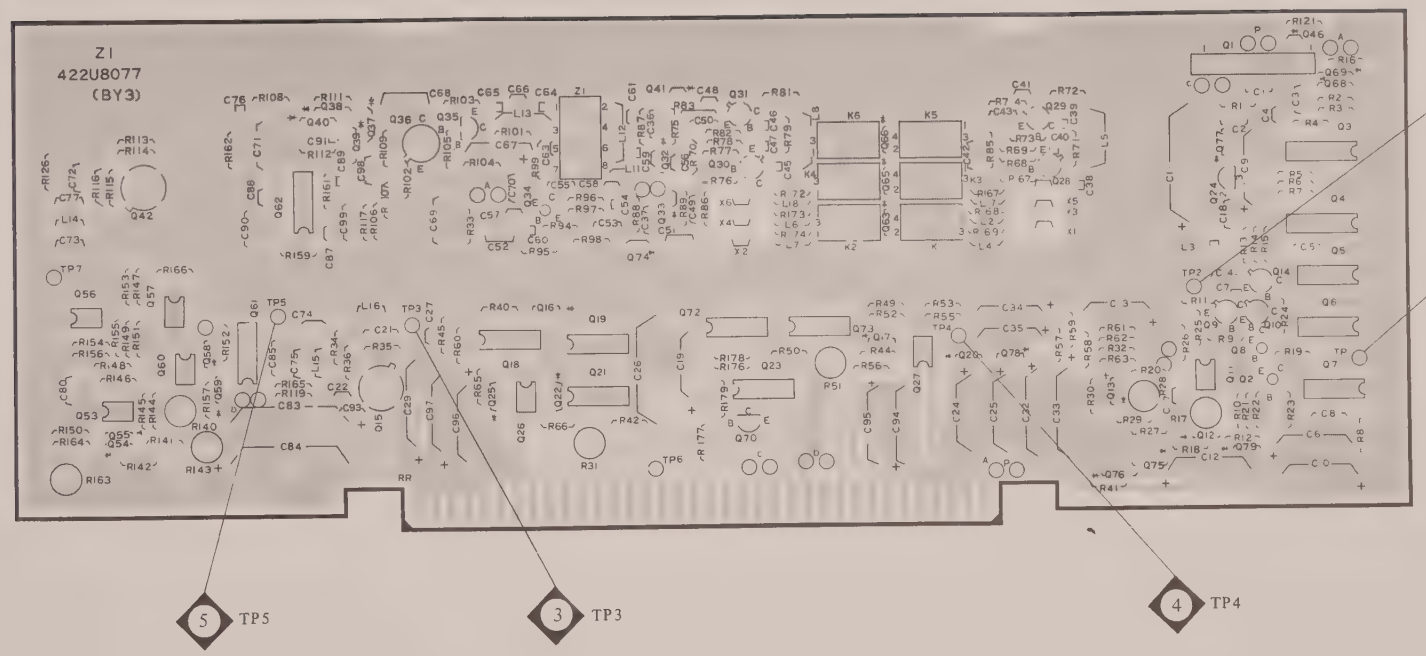
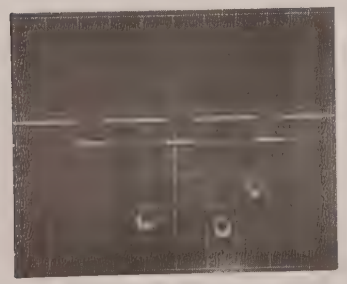


Fig. 6—IF Sweep Generator Test Points

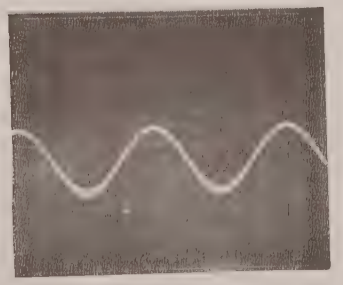
Z1 PCD and MARKER



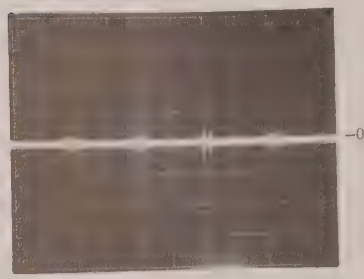
TP1
CENTER FREQUENCY 70MHz
ΔF SWEEP CW



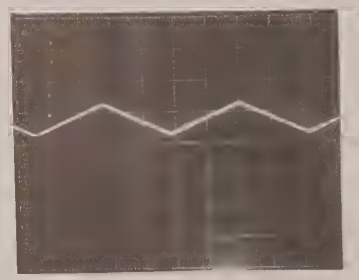
TP2
CENTER FREQUENCY 70MHz
ΔF SWEEP ±20MHz



TP3
CENTER FREQUENCY 70MHz
ΔF SWEEP ±2MHz



TP4
CENTER FREQUENCY 70MHz
ΔF SWEEP ±2MHz



TP5
CENTER FREQUENCY 70MHz
ΔF SWEEP ±20MHz

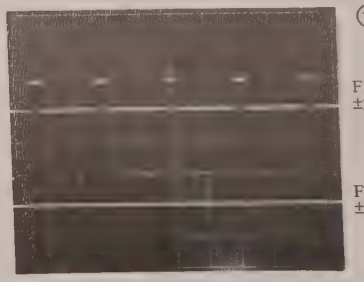


Fig. 7—IF Sweep Generator Test Points

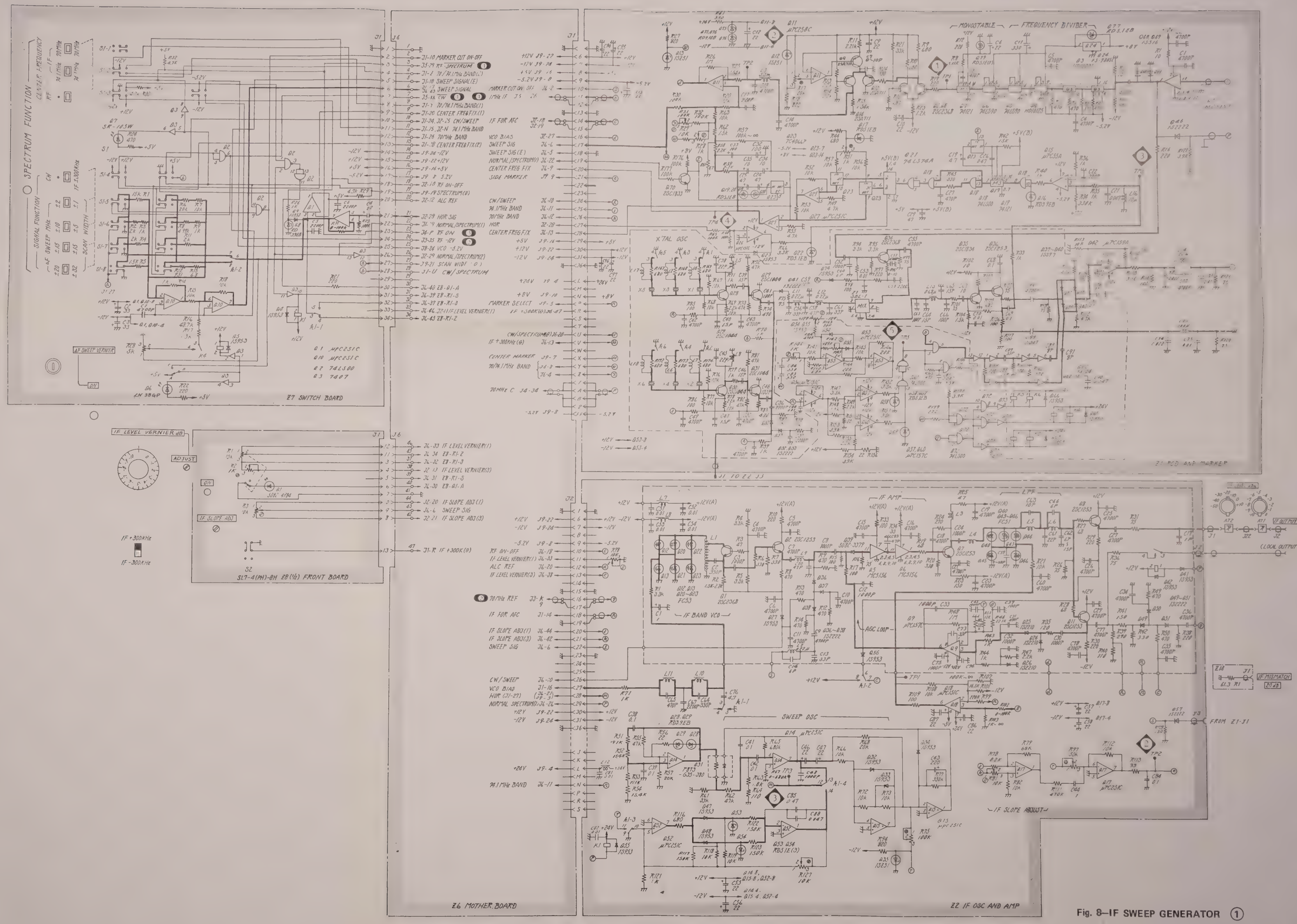


Fig. 8–IF SWEEP GENERATOR (1)

1

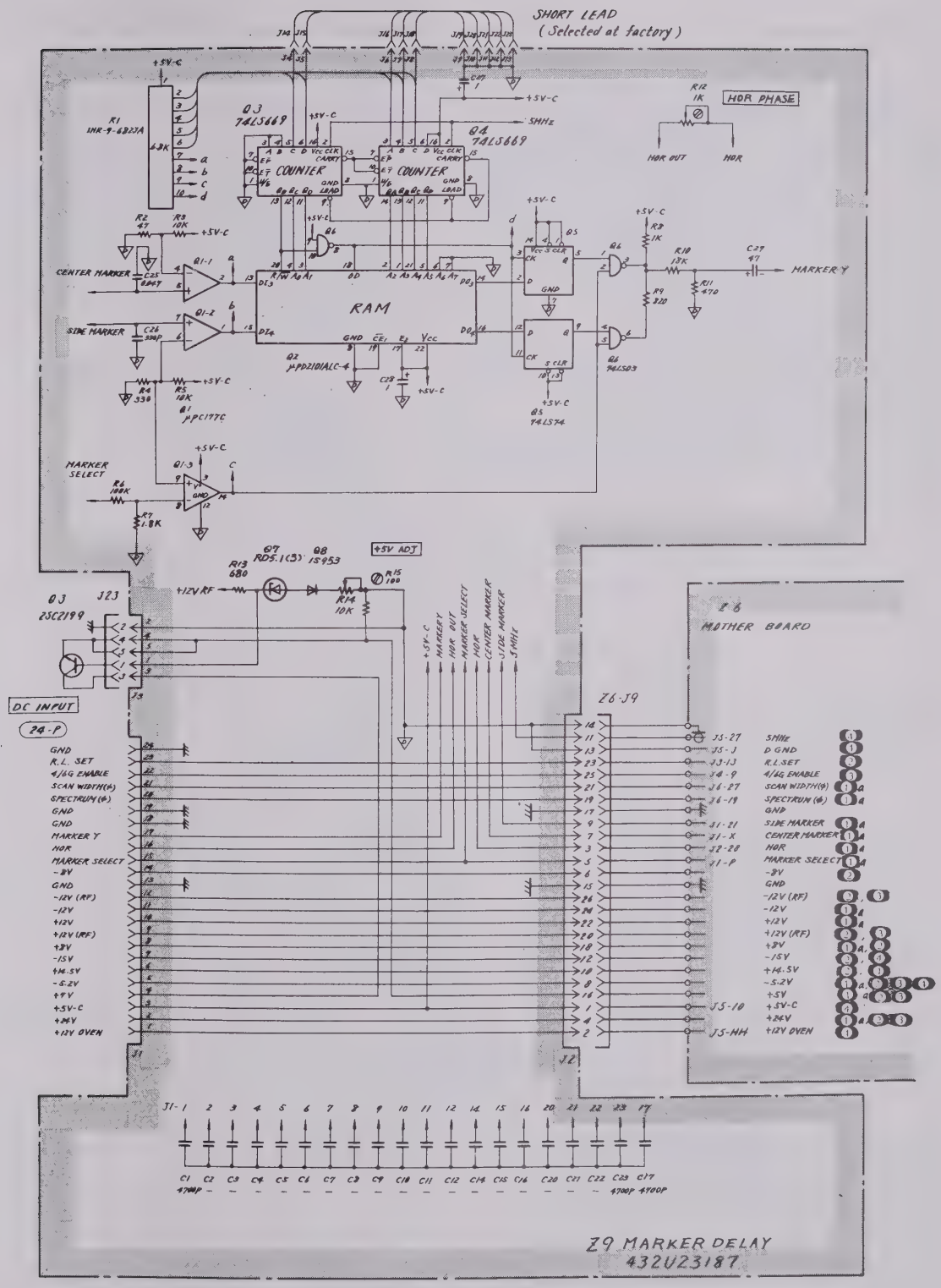


Fig. 9—IF SWEEP GENERATOR (1) Z9 MARKER DELAY

3. RF SWEEP GENERATOR

A. Circuit Description

3.01 Fig. 10 shows a simplified block diagram of the RF SWEEP GENERATOR.

The VCO (Z22) oscillator frequency is coarsely set by the frequency indicated on the RF CENTER FREQUENCY thumb wheel switch. The frequency signal is fed from the Z4 control circuit through a digital-analog converter, and applied to VCO (1GHz band), and its frequency is varied.

The VCO output signal is demultiplied 20:1 and counted by the frequency counter.

The frequency difference between the counter output and the control signal is detected by the comparator.

The difference digital signal is converted into an analog signal and applied to the VCO circuit loop.

Then, an Automatic Frequency Control loop is created and the VCO frequency can be exactly controlled by this loop.

The output frequency is subsequently fed to YTO Z29, Z20 or Z16 (2, 4, 6 or 11GHz band) through the D/A conversion circuit. The YTO oscillator frequency is coarse set as required.

The YTO output frequency is mixed with the harmonics of the VCO output and the IF signal is derived.

The phase difference between the IF signal derived from the mixer and the IF Sweep Generator signal is returned to the YTO circuit.

The YTO oscillator frequency is controlled by this phase lock loop signal.

The Z4 control circuit consists of a microprocessor, program memory (ROM), and an I/O control in circuit. Z4 has the following functions:

- Read in of frequency information
- Linearity compensation of frequency vs Voltage characteristics of VCO
- D/A converter driving
- Comparator control

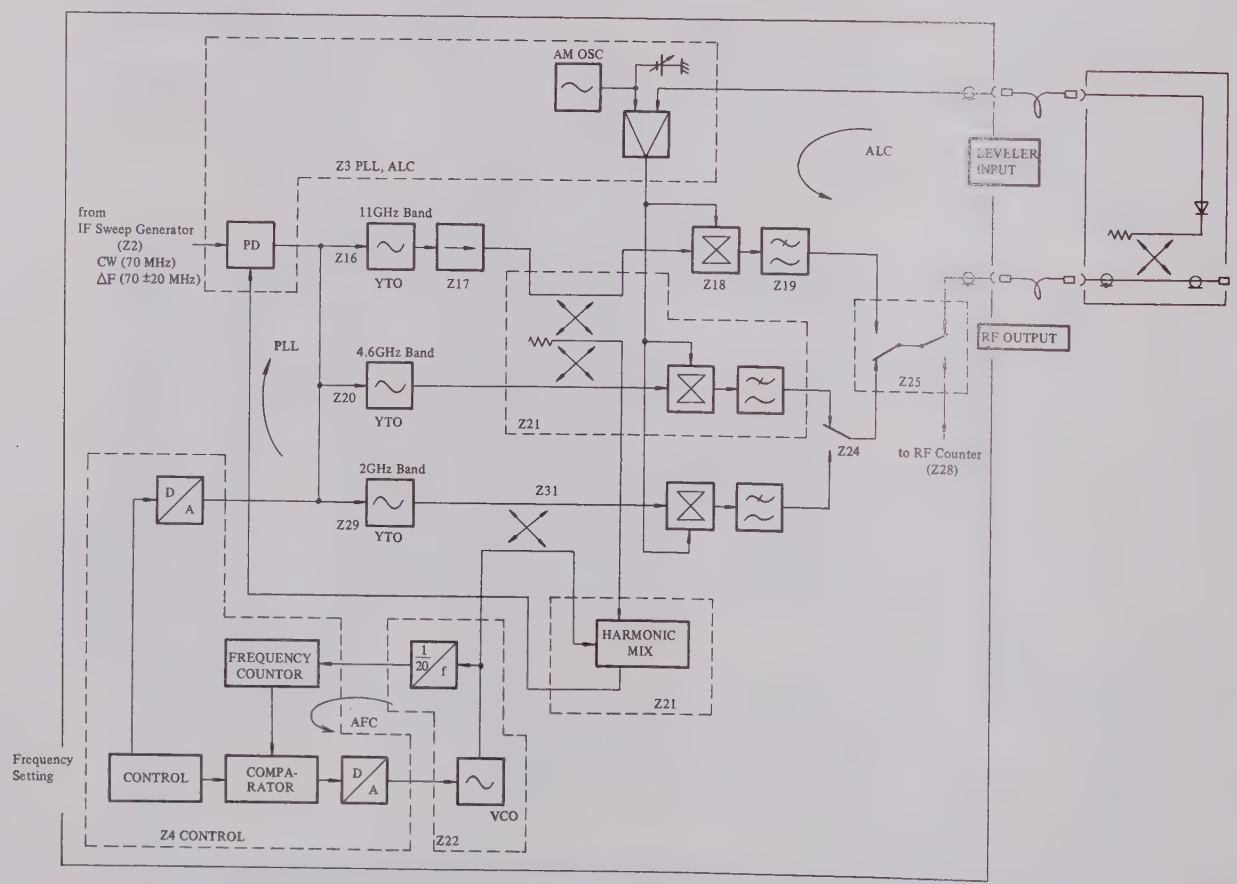


Fig. 10—RF Sweep Generator Block Diagram

B. RF Sweep Generator Troubleshooting

3.02 This paragraph describes the method of isolating the P.C. board in which trouble has occurred. Determine the defective board or part by the flow chart in Fig. 11.

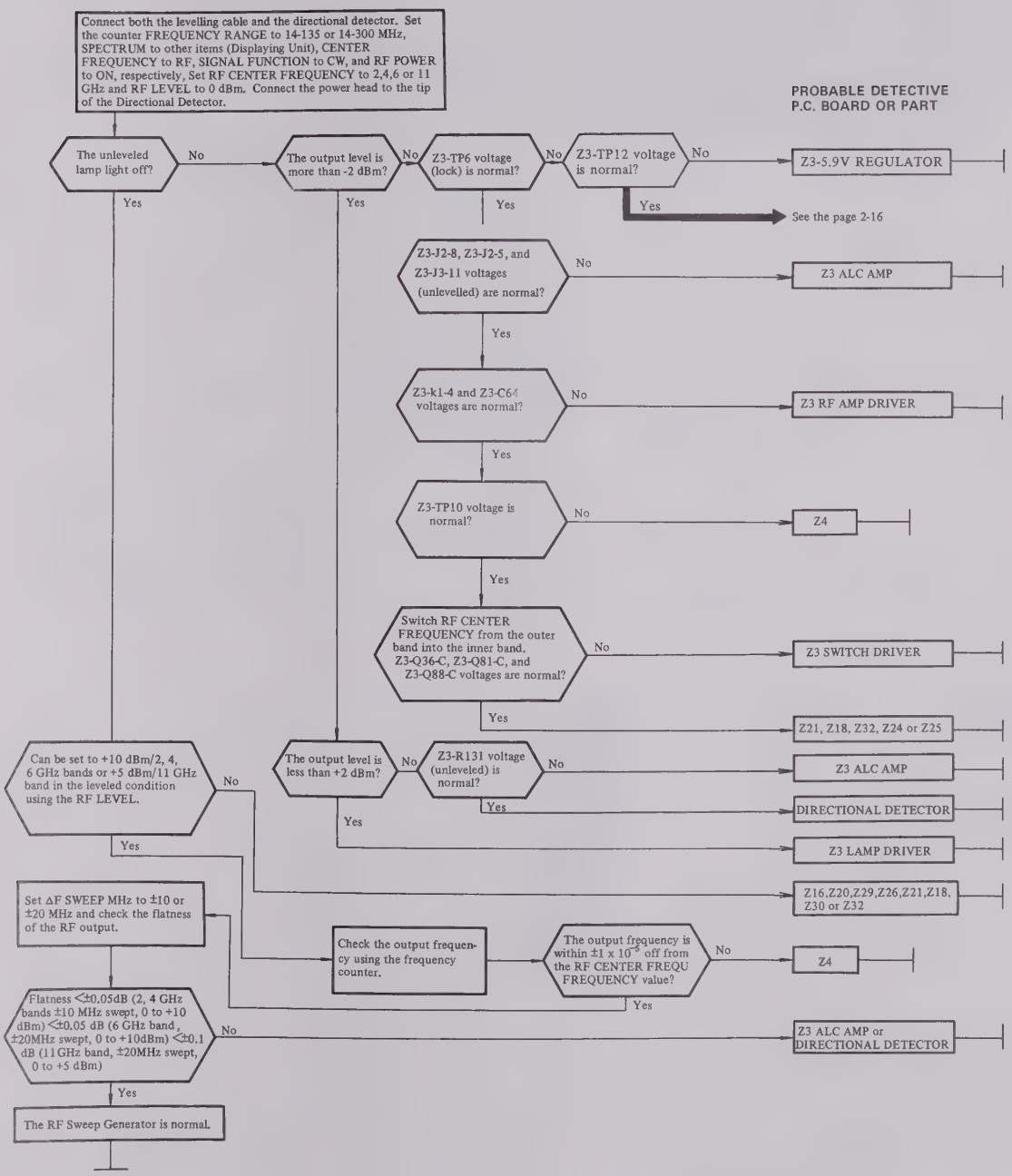

Connect both the levelling cable and the directional detector. Set the counter FREQUENCY RANGE to 14-135 or 14-300 MHz, SPECTRUM to other items (Displaying Unit), CENTER FREQUENCY to RF, SIGNAL FUNCTION to CW, and RF POWER to ON, respectively, Set RF CENTER FREQUENCY to 2,4,6 or 11 GHz and RF LEVEL to 0 dBm. Connect the power head to the tip of the Directional Detector.
PROBABLE DETECTIVE P.C. BOARD OR PART
The unleveled lamp light off?
No
Yes
The output level is more than -2 dBm?
No
Yes
Z3-TP6 voltage (lock) is normal?
No
Yes
Z3-TP12 voltage is normal?
No
Yes
Z3-5.9V REGULATOR
See the page 2-16
Z3-J2-8, Z3-J2-5, and Z3-J3-11 voltages (unlevelled) are normal?
No
Yes
Z3 ALC AMP
Z3-k1-4 and Z3-C64 voltages are normal?
No
Yes
Z3 RF AMP DRIVER
Z3-TP10 voltage is normal?
No
Yes
Z4
Switch RF CENTER FREQUENCY from the outer band into the inner band. Z3-Q36-C, Z3-Q81-C, and Z3-Q88-C voltages are normal?
No
Yes
Z3 SWITCH DRIVER
Z21, Z18, Z32, Z24 or Z25
Can be set to +10 dBm/2, 4, 6 GHz bands or +5 dBm/11 GHz band in the leveled condition using the RF LEVEL.
No
Yes
The output level is less than +2 dBm?
No
Yes
Z3-R131 voltage (unleveled) is normal?
No
Yes
Z3 ALC AMP
DIRECTIONAL DETECTOR
Z3 LAMP DRIVER
Z16,Z20,Z29,Z26,Z21,Z18, Z30 or Z32
Set ΔF SWEEP MHz to ±10 or ±20 MHz and check the flatness of the RF output.
Check the output frequency using the frequency counter.
The output frequency is within ±1 x 10⁻⁵ off from the RF CENTER FREQU FREQUENCY value?
No
Yes
Z4
Flatness <±0.05dB (2, 4 GHz bands ±10 MHz swept, 0 to +10 dBm) <±0.05 dB (6 GHz band, ±20MHz swept, 0 to +10dBm) <±0.1 dB (11GHz band, ±20MHz swept, 0 to +5 dBm)
No
Yes
Z3 ALC AMP or DIRECTIONAL DETECTOR
The RF Sweep Generator is normal.

Fig. 11—RF Sweep Generator Troubleshooting Flow Chart (1/2)

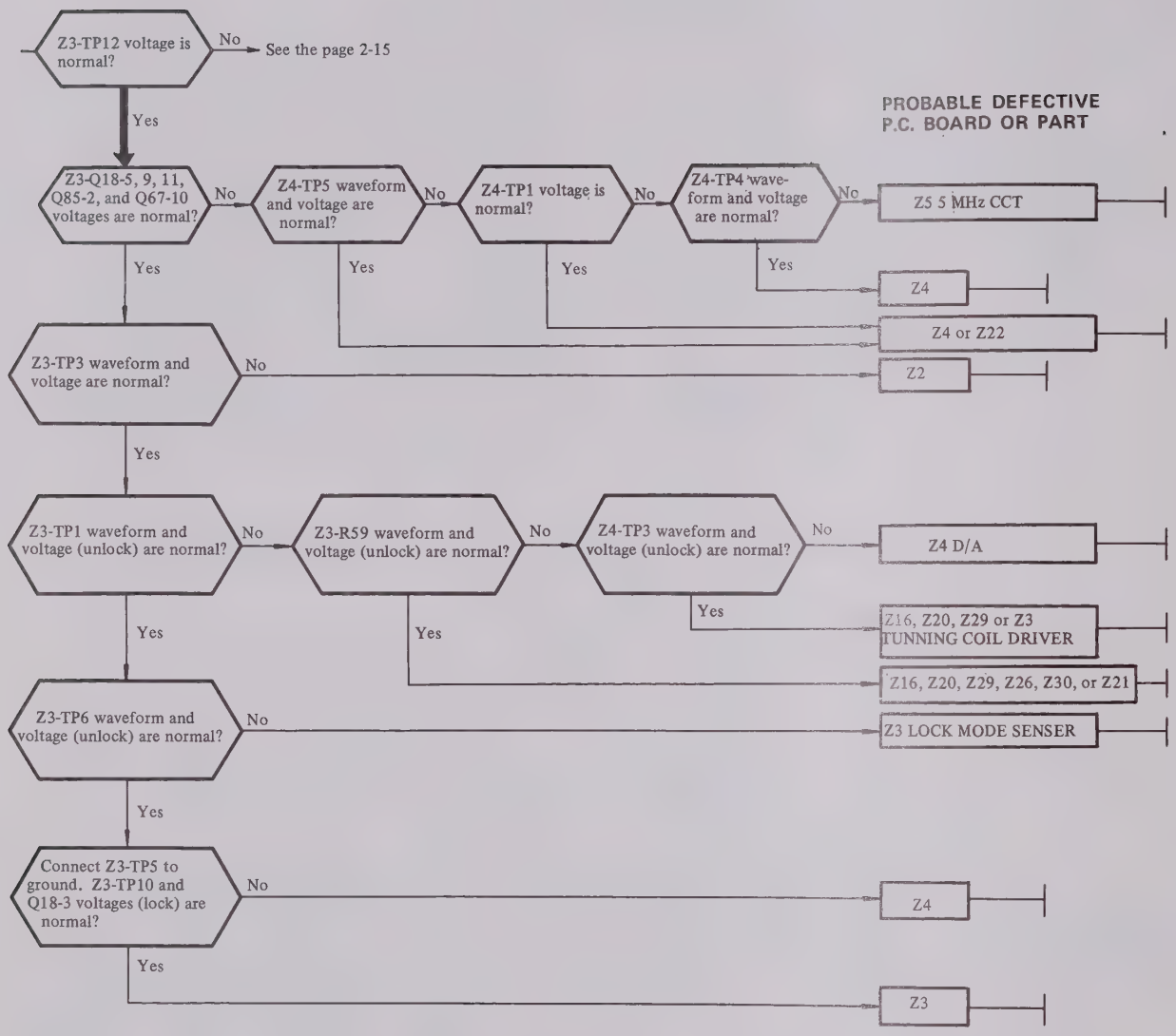
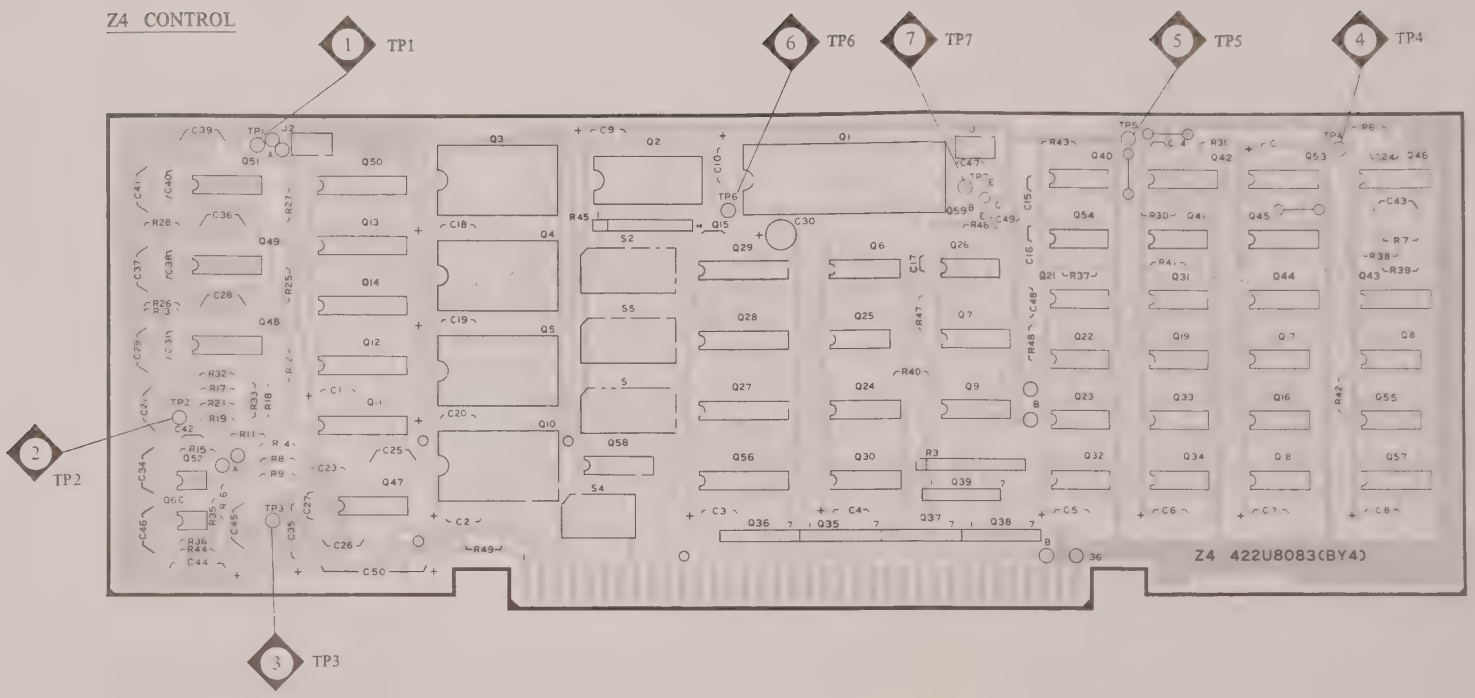
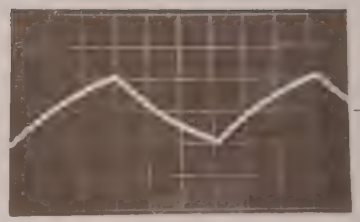


Fig. 11 RF Sweep Generator Troubleshooting Flow Chart (2/2)



TP3



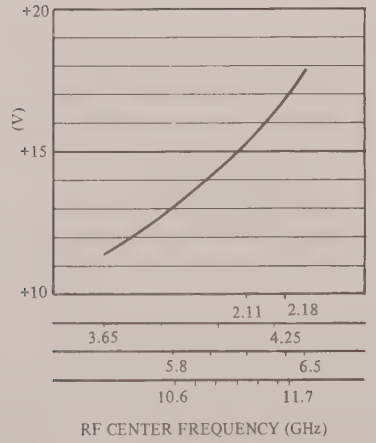
Ⓥ : 200mV/div
Ⓗ : 0.2 sec/div

-DC voltage:
See the table below.

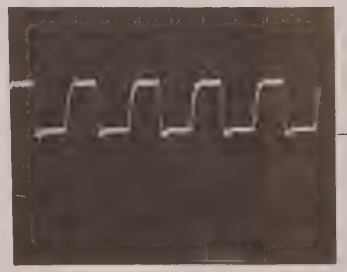
at PLL unlock.

RF CENTER FREQUENCY (GHz)	3.65	3.95	4.25	5.8	6.2	6.5
DC voltage (+V)	1.01	1.85	2.68	7.00	8.11	8.95
RF CENTER FREQUENCY (GHz)	2.11	2.18	10.6	11.2	11.7	
DC voltage (+V)	2.96	3.15	2.96	4.63	6.02	

TP1



TP4



Ⓥ : 2V/div
Ⓗ : 0.1μsec/div

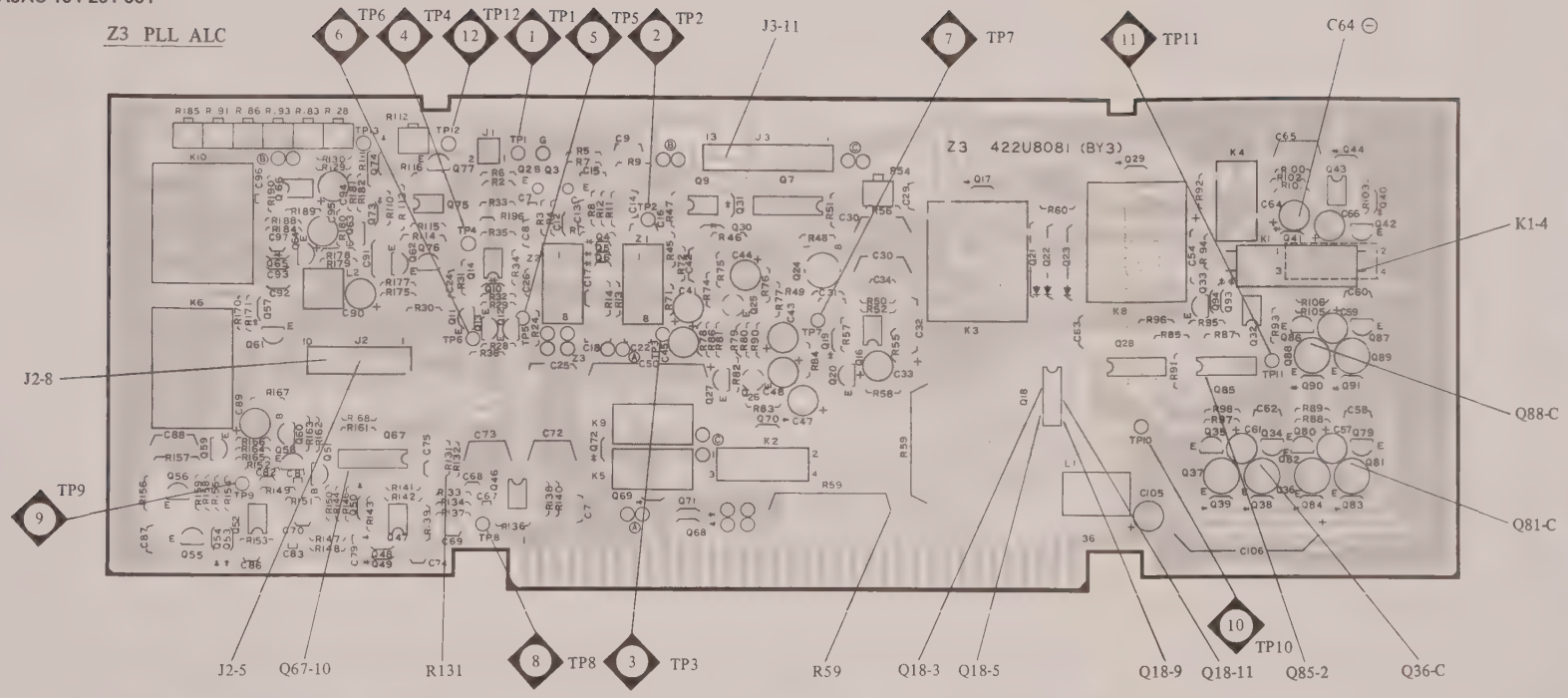
TP5

Ⓥ : 2V/div
Ⓗ : 20nsec/div

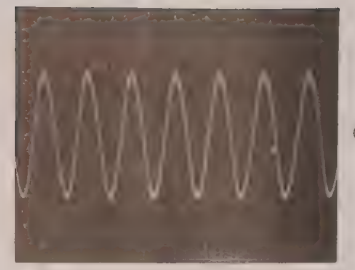
frequency
= (RF CENTER FREQUENCY
-70MHz)/20n
n = 2 2GHz Band
n = 4 4GHz Band
n = 6 6GHz Band
n = 11 11GHz Band

Fig. 12—RF Sweep Generator Test Points

Z3 PLL ALC



TP3

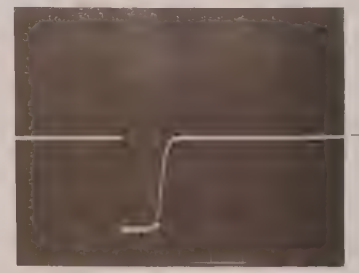


Ⓥ : 200mV/div
Ⓗ : 10 nsec/div

0V

SIGNAL FUNCTION: CW

Q36-C
Q81-C
Q88-C

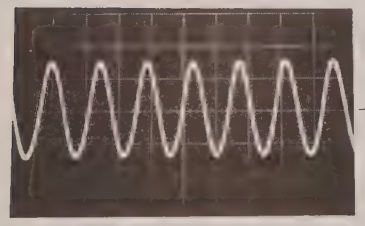


Ⓥ : 5V/div
Ⓗ : 100msec/div

−0V

RF POWER: OFF→ ON

TP1

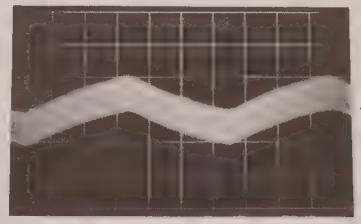


Ⓥ : 500mV/div
Ⓗ : 10nsec/div

−0V

at PLL lock

R59



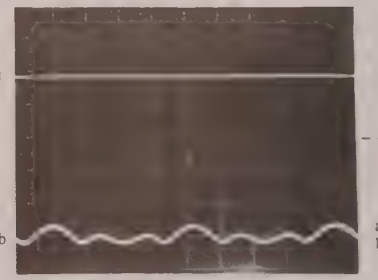
Ⓥ : 50mV/div
Ⓗ : 0.2sec/div

−DC voltage:
See the table below.

at PLL unlock

RF CENTER FREQUENCY (GHz)	3.65	3.95	4.25	5.8	6.2	6.5
DC Voltage (+V)	1.32	1.45	1.56	2.12	2.27	2.38
RF CENTER FREQUENCY (GHz)	2.11	2.18	10.6	11.2	11.7	
DC Voltage (+V)	0.73	0.75	3.31	3.50	3.66	

R131

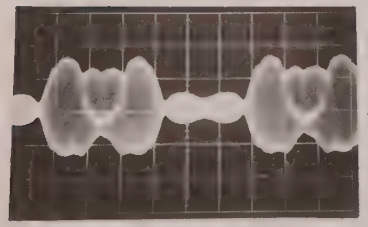


Ⓥ : 0.1V/div
Ⓗ : 5msec/div

− −0.4V

a : Leveled (+10dBm)
b : Unleveled (+18dBm)
at ±20MHz Swept

TP1

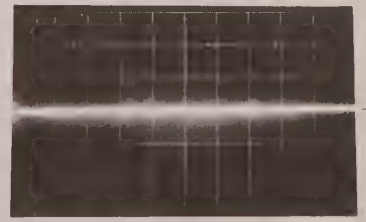


Ⓥ : 500mV/div
Ⓗ : 0.2sec/div

−0V

at PLL unlock

TP6



Ⓥ : 2V/div
Ⓗ : 0.2sec/div

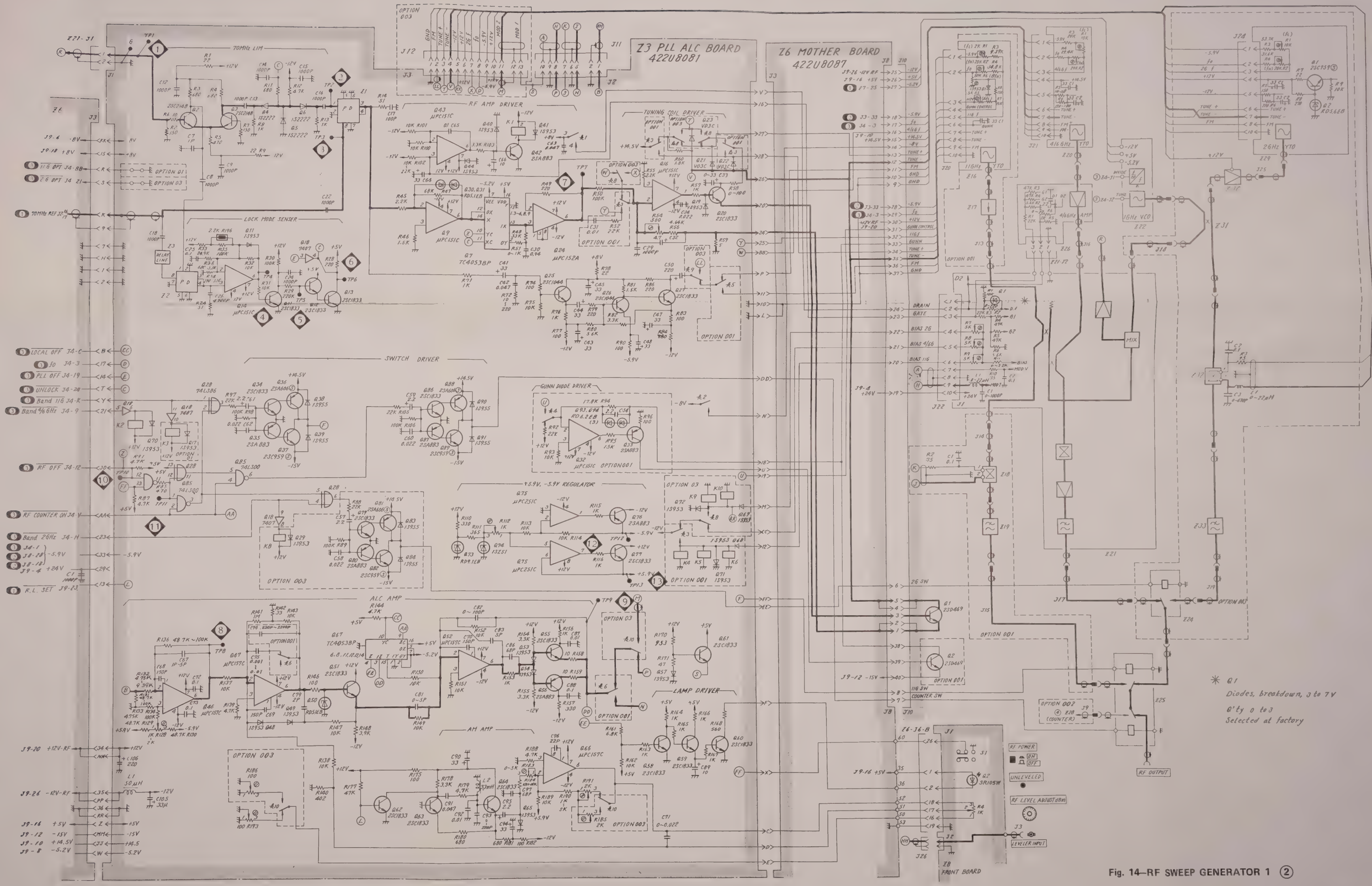
− 0V

at PLL unlock

TP6	+4.26V at PLL Lock
TP12	−5.90V
Q18 - 5	TTL Low-level at 4/6GHz Band
Q18 - 9	TTL Low-level at 2GHz Band
Q18 - 11	TTL Low-level at 11GHz Band
Q85 - 2	TTL Low-level at RF Counter ON
Q67 - 10	TTL High-level at RF Sweeper

TP10	TTL High-level at PLL Lock
Q18 - 3	TTL High-level at PLL Lock
J2 - 8	−2.6V at 4/6GHz Band, unleveled
J2 - 5	−2.6V at 11GHz Band, unleveled
J3 - 11	−2.6V at 2GHz Band, unleveled
K1 - 4	+8V
C64 ⊖	−7V

Fig. 13 RF Sweep Generator Test Points


Z3 PLL ALC BOARD
422U8081
Z6 MOTHER BOARD
422U8087
RF AMP DRIVER
TUNING COIL DRIVER
LOCK MODE SENSER
SWITCH DRIVER
GUNN DIODE DRIVER
+5.9V, -5.9V REGULATOR
ALC AMP
AM AMP
LAMP DRIVER
OPTION 003
OPTION 001
OPTION 03
70MHz LIM
Z6
Z3
Z2
Z1
Z8 FRONT BOARD
J3
J12
J11
J1
J2
J8
J10
J9
J4
J5
J6
J7
J20
J21
J22
J24
J25
J26
J27
J28
J29
J30
J31
J32
J33
J34
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J48
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J54
J55
J56
J57
J58
J59
J60
J61
J62
J63

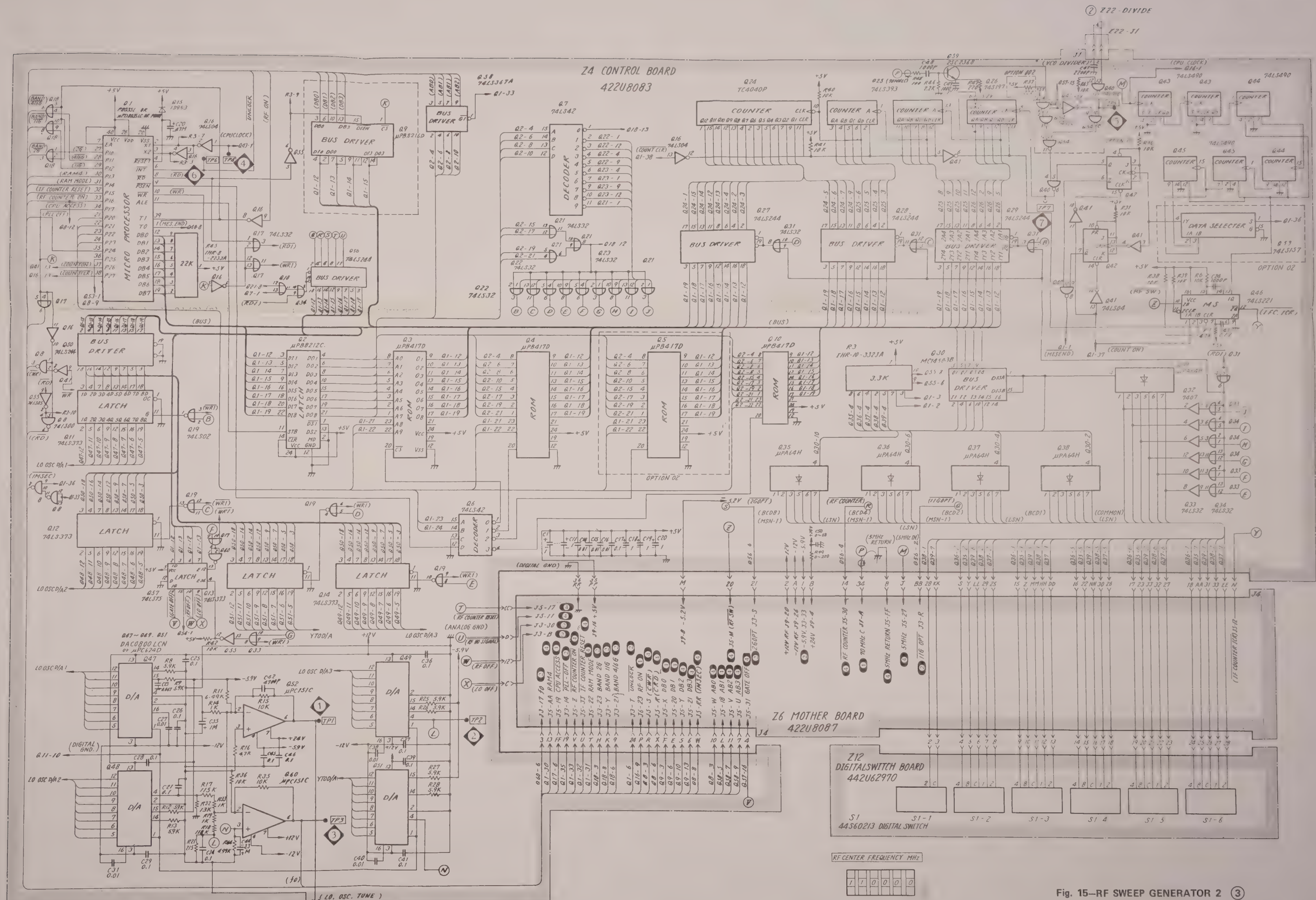


Fig. 15—RF SWEEP GENERATOR 2 (3)

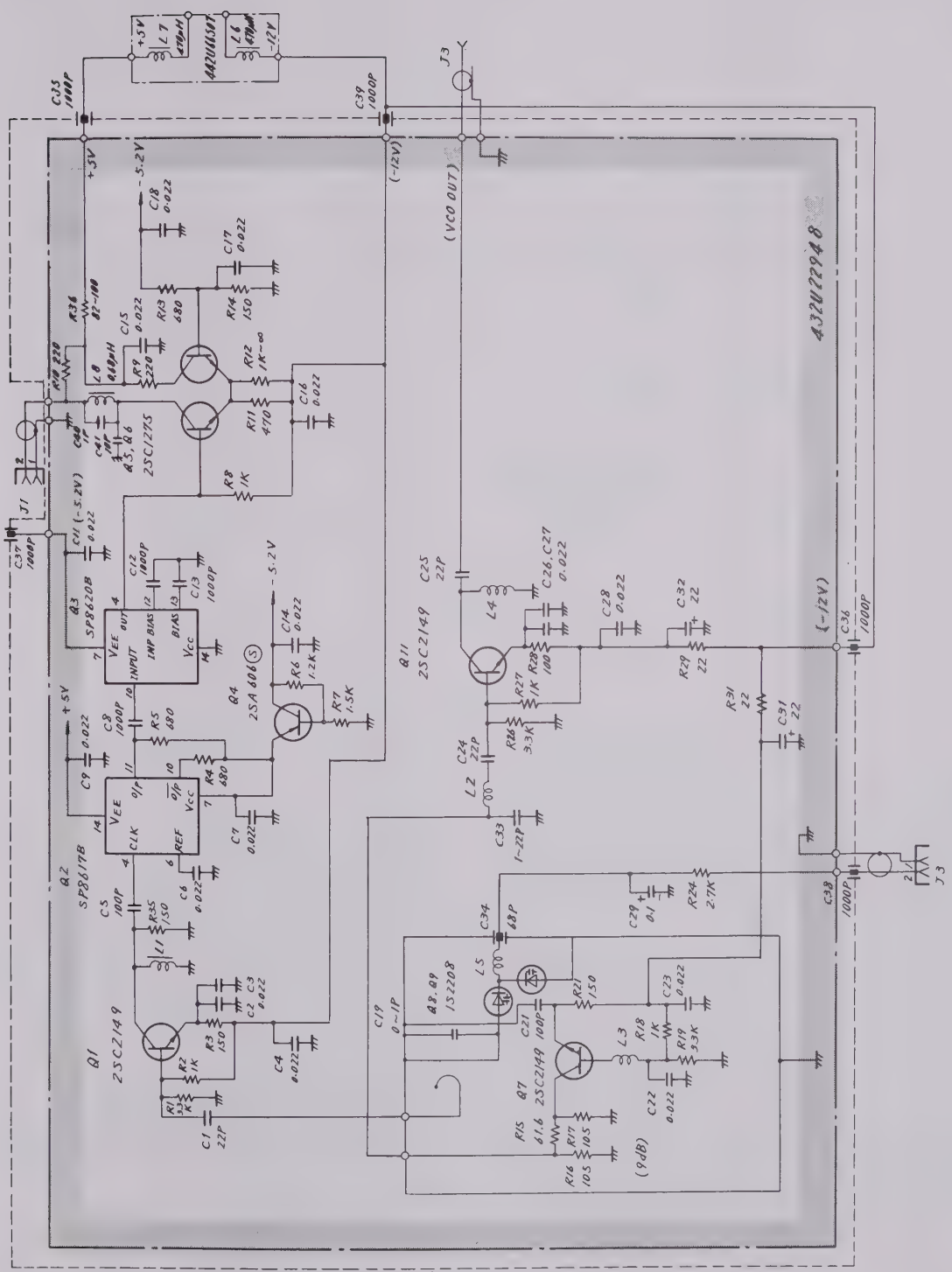


Fig. 16–RF SWEEP GENERATOR 1 ② Z22 VCO

4. FREQUENCY COUNTER

A. Circuit Description

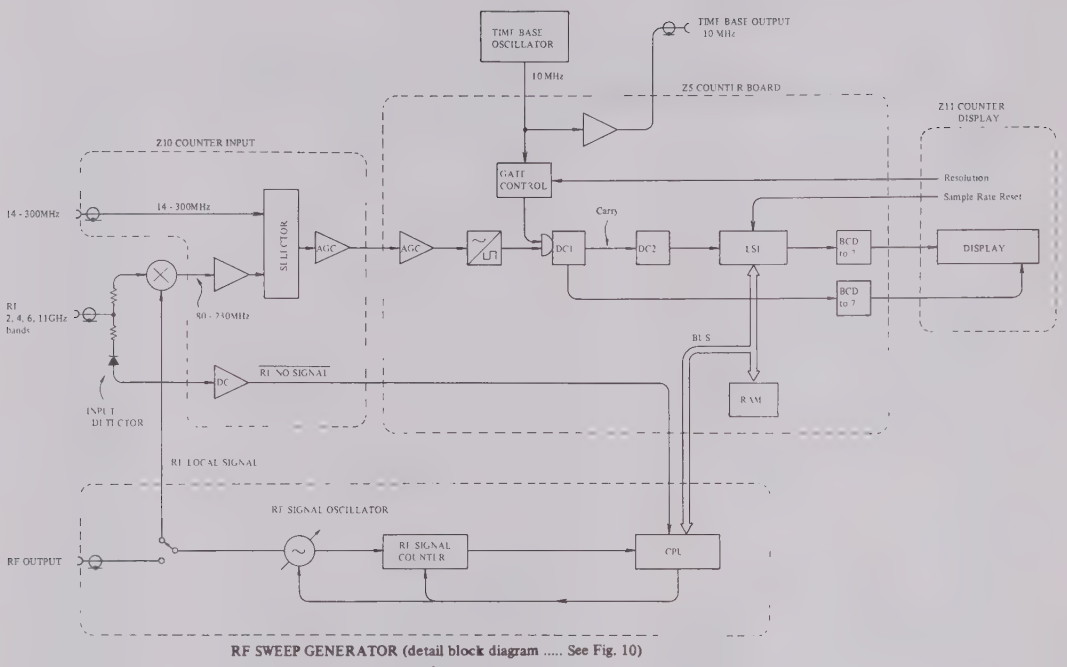


Fig. 17—Frequency Counter Block Daigram

4.01 There are two input terminals; 14 to 300MHz and RF. The input signal from these terminals is applied to Decade Counter 1 through the main gate, and controlled from the AGC AMP (Note) and PULSE SHAPER circuit that converts the input to a rectangular wave, and a 10MHz TIME BASE OSCILLATOR. Decade Counter 1 has two outputs; BCD and CARRY. The BCD illuminates the last digit through the BCD to 7 LATCH/DECODER. The CARRY signal is sent to the display through DECADE COUNTER 2 and an LSI. The LSI consists of seven decade counters, an 8 digit shift register, and a zero blanking circuit.

The time the main gate is opened is selected from among 0.1, 1 and 10 seconds by the RESOLUTION switch on the front panel. The interval from closing of the main gate to reopening of the main gate is selected from among approximately 0.08, 0.8, 2 seconds, and infinite by the SAMPLE RATE switch on the front panel.

The measurement operation time chart is shown in Fig. 18.

When the RF signal is measured (option 002), RESOLUTION AND SAMPLE RATE are both fixed at 1kHz and 0.8sec., respectively.

The IF signal (80 to 230MHz), obtained by mixing the measured signal and RF LOCAL signal, is counted by DC1, DC2, and LSI, then stored in the RAM. The measured signal frequency is counted by the CPU according to the value stored in the RAM and the RF LOCAL signal frequency, then displayed through BCD to 7.

Note: AGC AMP

When the S/N ratio of the input signal is poor, the output waveform of the PULSE SHAPER will be erratic, causing misscounts. The AGC AMP reduces this misscounting.

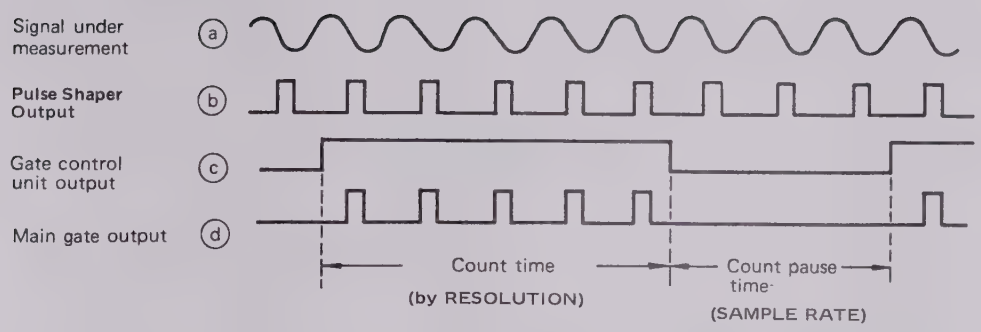


Fig. 18—Time Chart

B. Frequency Counter Troubleshooting

4.02 This paragraph describes the method of isolating the P.C. board in which trouble has occurred. Determine the defective P.C. board or part by the flow chart in Fig. 19.

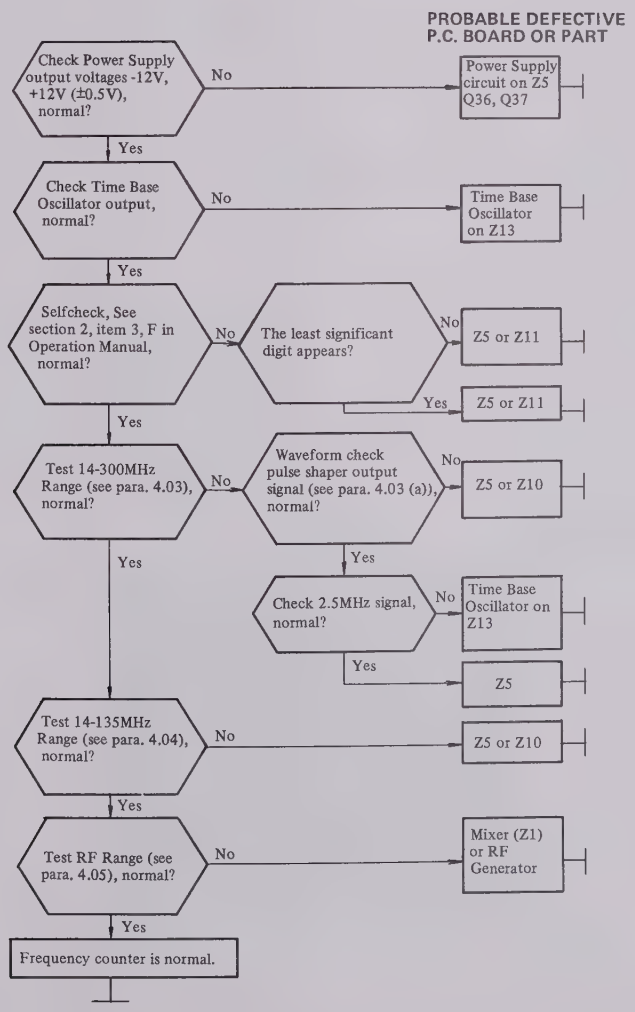


Fig. 19—Frequency Counter Troubleshooting Flow Chart

4.03 *14-300MHz/50 Ω INPUT Calibration:*

STEP	PROCEDURE
1	Connect the Frequency Synthesizer MG 545K output to INPUT 50Ω (52) as shown in Fig. 20.
2	Set MG545K controls as follows: FREQUENCY – 300.000 00000MHz OUTPUT level – -23dBm (15mVrms) to +10dBm (0.7Vrms)
3	Set the Counter controls as follows: FREQUENCY RANGE MHz – 14–300/50 (54) RESOLUTION Hz (55) – 1Hz SAMPLE RATE (57) – 0.08sec.
4	The display should be 300.000 000MHz (±1 count).
5	Vary the frequency of MG545K from 14MHz to 300MHz and check that the display is correct.

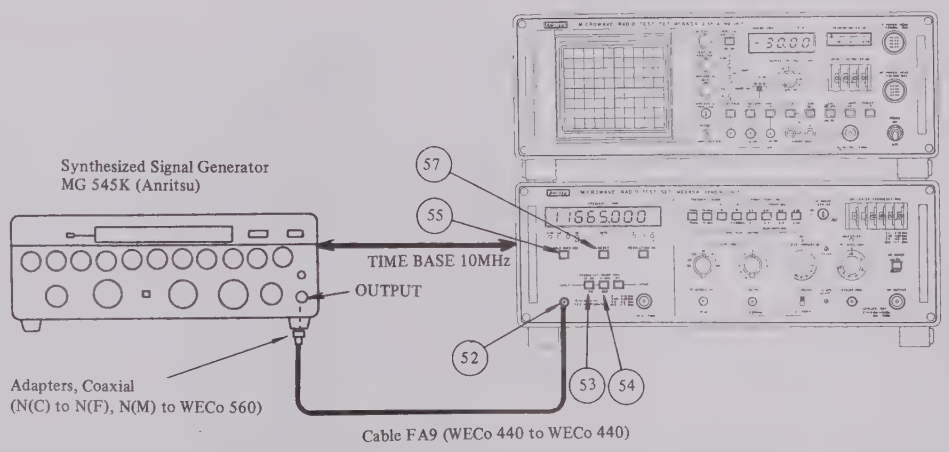


Fig. 20–14-300MHz/14-135MHz INPUT Calibration

(a) Pulse Shaper Output Signal Waveform Check:

STEP	PROCEDURE
1	Apply 50MHz signal to INPUT (52).
2	Connect a oscilloscope as shown in Fig. 21.
3	Check that the waveform at Z5 TP3 is as shown in Fig. 22 and that the voltage is 0.4 to 1Voltsp-p.

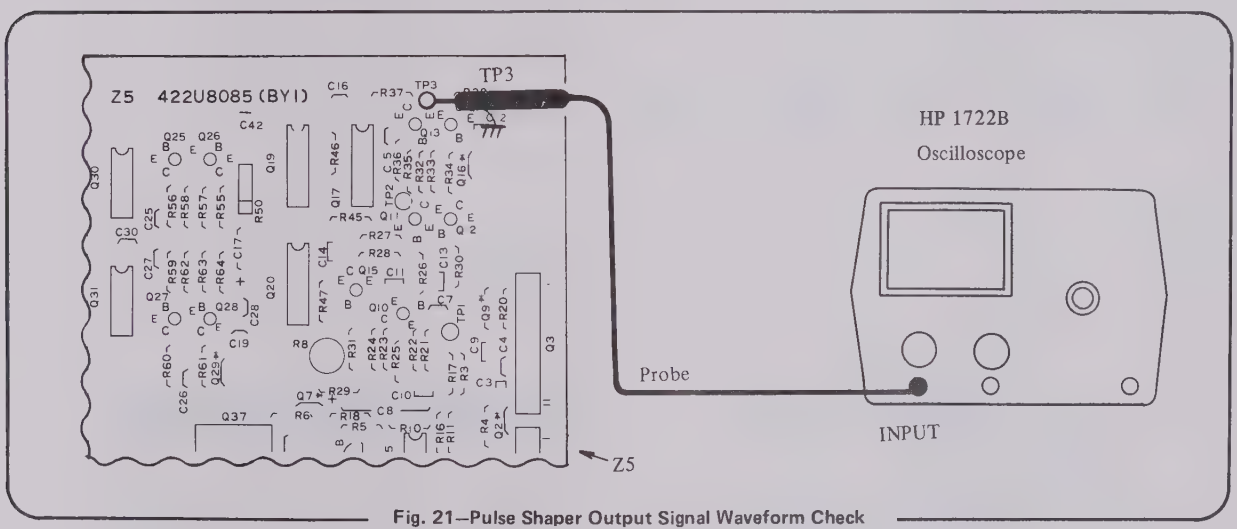


Fig. 21—Pulse Shaper Output Signal Waveform Check

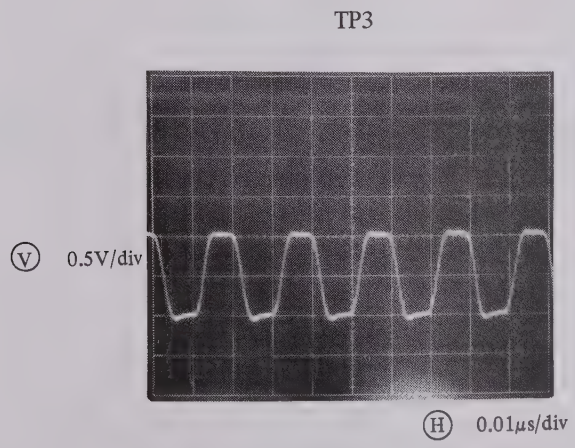


Fig. 22—Pulse Shaper Output Waveform

(b) f/20 Signal Check: Connection is shown in Fig. 20.

STEP	PROCEDURE
1	Set the Counter controls as follows: FREQUENCY RANGE ..... 14–300 (54) RESOLUTION Hz (55) ..... 0.1 SAMPLE RATE (57) ..... 0.08sec.
2	Apply 50MHz signal to INPUT (52).
3	Check the TP5 on Z5 with oscilloscope. A normal waveform should be present (2.5MHz TTL level) in Fig.20.

4.04 ***14-135MHz/1MΩ INPUT Calibration:*** Connection is shown in Fig. 20.

STEP	PROCEDURE
1	Set MG545K controls as follows: FREQUENCY ..... 135.000 00000MHz OUTPUT level ..... –31dBm (15mVrms) to +10dBm (1.7Vrms)
2	Set the Counter controls as follows: FREQUENCY RANGE MHz ..... 14 – 135 (53) RESOLUTION Hz (55) ..... 1 SAMPLE RATE (57) ..... 0.08sec.
3	The display should be 135.000 000MHz (±1 count).
4	Vary the frequency of MG545K from 14MHz to 135MHz and check that the display is correct.

4.05 *RF INPUT Calibration (Option 002):*

STEP	PROCEDURE
1	Connect as shown in Fig. 23.
2	Set the 8672A (HP) frequency to any of 4/6/11GHz band frequencies and the output power between +7dBm and −20dBm.
3	Set the MRTS Sending Unit controls as follows: CENTER FREQUENCY ..... RF (72) SWEEP FUNCTION ..... CW (69) FREQUENCY RANGE MHz ..... RF (61)
4	The frequency of the 8672A (HP) and the value displayed on the MRTS should coincide within ±1ppm.

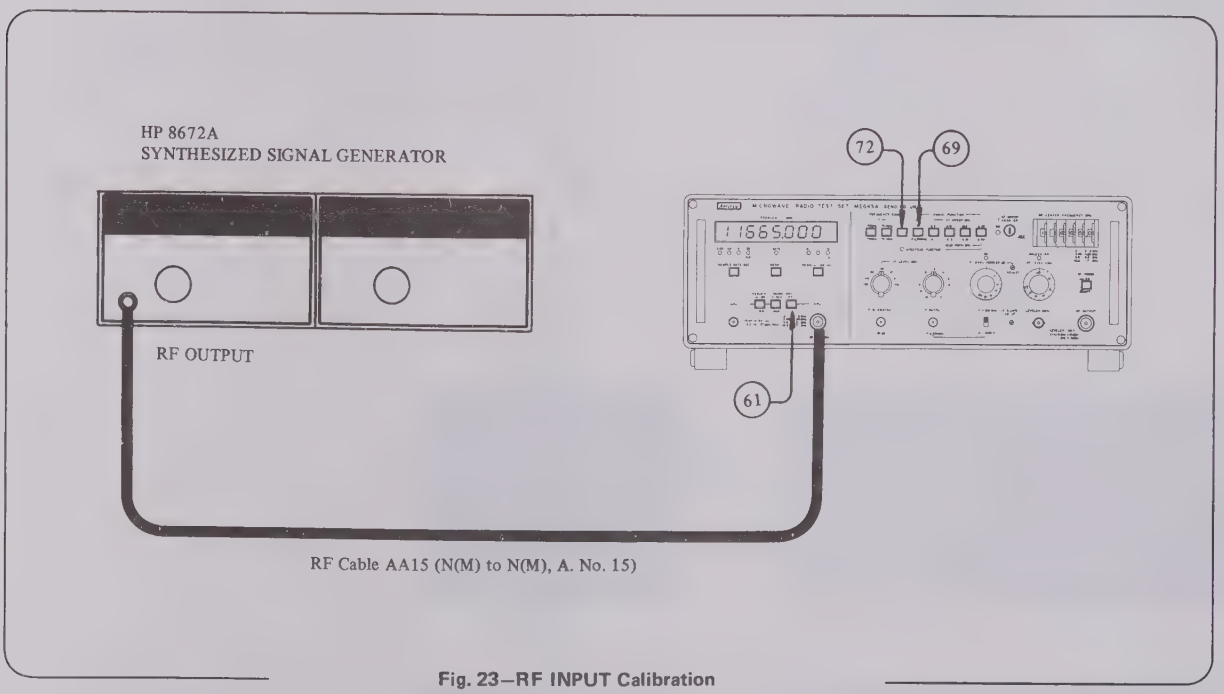
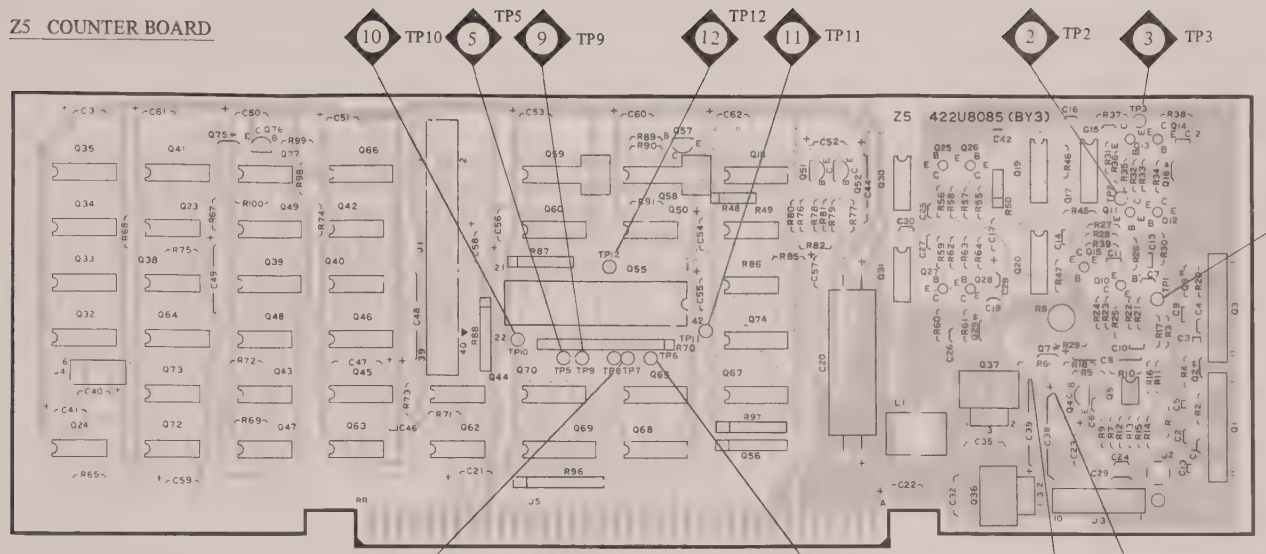


Fig. 23—RF INPUT Calibration

Z5 COUNTER BOARD



TP7, TP8

Using a DC voltmeter or oscilloscope, check logical status at TP7 and TP8. The logic level should change to the following status with position of SAMPLE RATE.

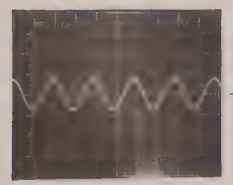
SAMPLE RATE	(SR1) TP7	(SR2) TP8
approx. 80ms	0	0
approx. 0.8s	1	0
approx. 2s	0	1
∞	1	1

0: TTL Low-level
1: TTL high-level

TTL low-level when RESET switch is pushed

Note: Waveform of TP1, TP2, TP3 and TP5 are observed by following conditions.
Input signal: 50MHz
Resolution: 0.1Hz

TP1



Ⓥ : 0.5V/div
Ⓗ : 0.01μsec/div

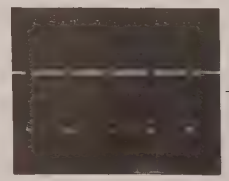
TP3

Ⓥ : 0.5V/div
Ⓗ : 0.01μsec/div

TP9

Ⓥ : 1V/div
Ⓗ : 0.5μsec/div

TP11



Ⓥ : 5V/div
Ⓗ : 10μsec/div

TP2

Ⓥ : 0.5V/div
Ⓗ : 0.01μsec/div

TP5

Ⓥ : 1V/div
Ⓗ : 0.2μsec/div

TP10

Ⓥ : 5V/div
Ⓗ : 10μsec/div

TP12

Ⓥ : 5V/div
Ⓗ : 0.2μsec/div

Fig. 24—Frequency Counter Test Points

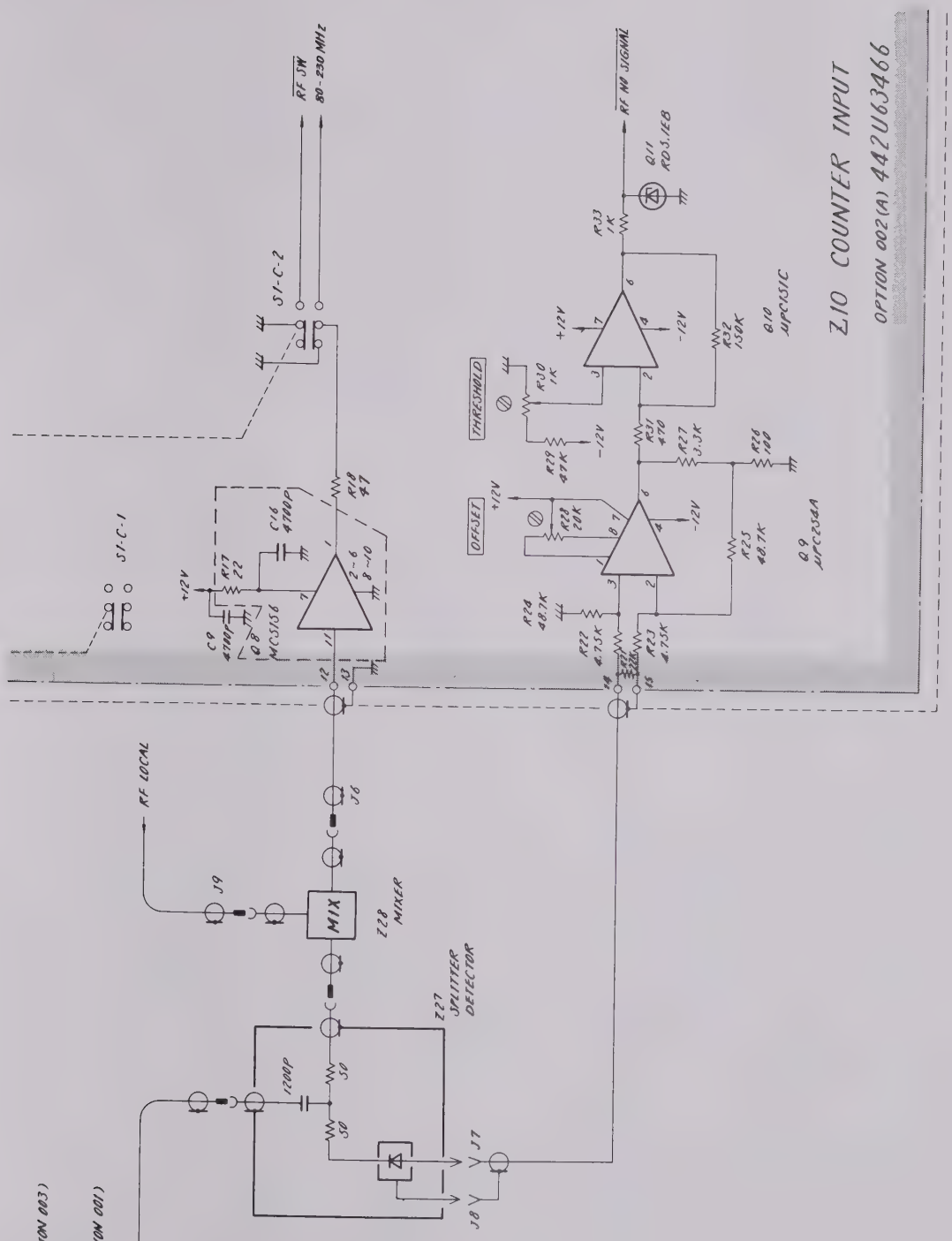


Fig. 25—FREQUENCY COUNTER (4)

Z10 COUNTER INPUT, OPTION 002 (A)

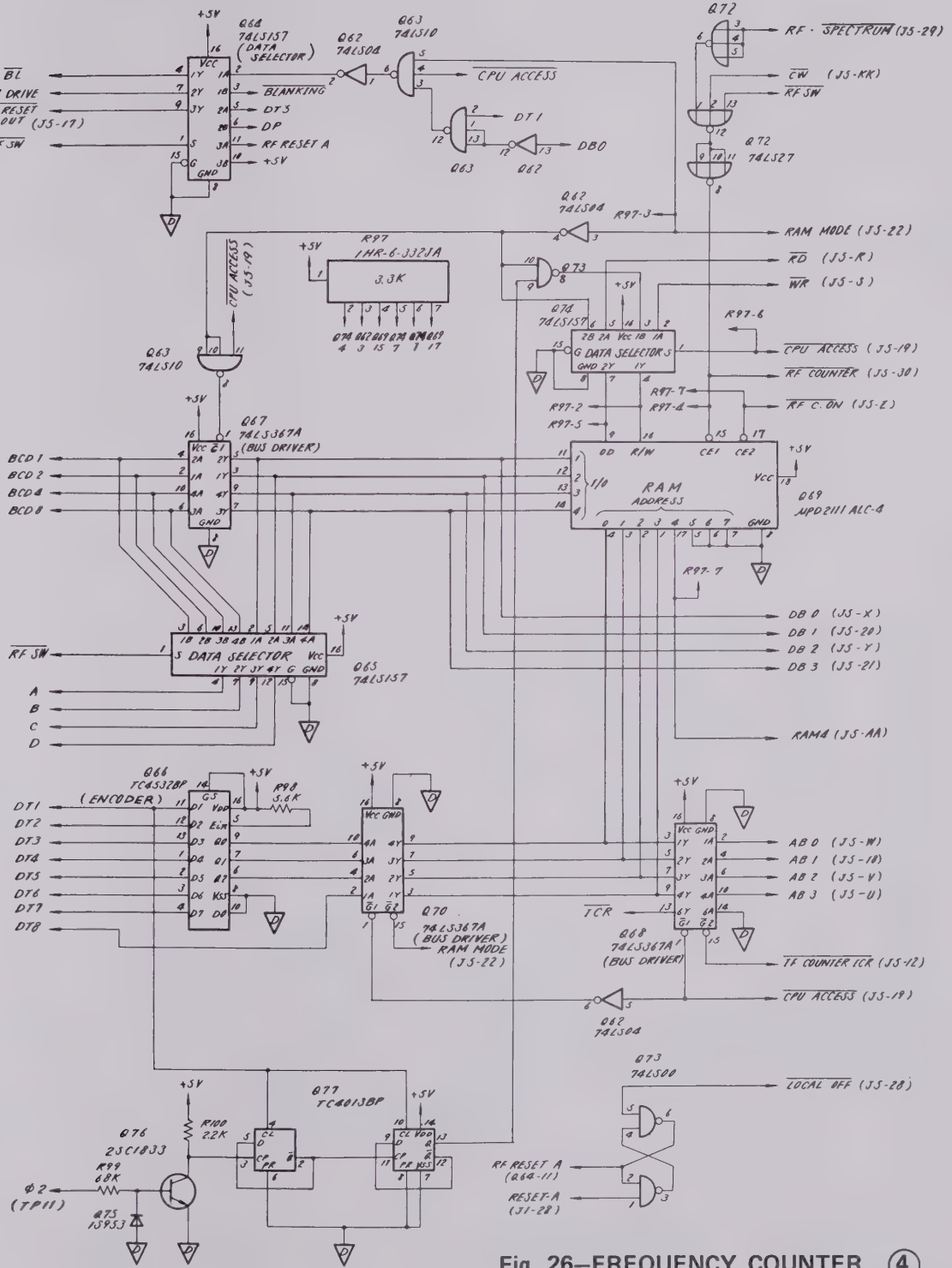


Fig. 26—FREQUENCY COUNTER (4)

Z5 COUNTER BOARD, OPTION 002 (B) 422U8085

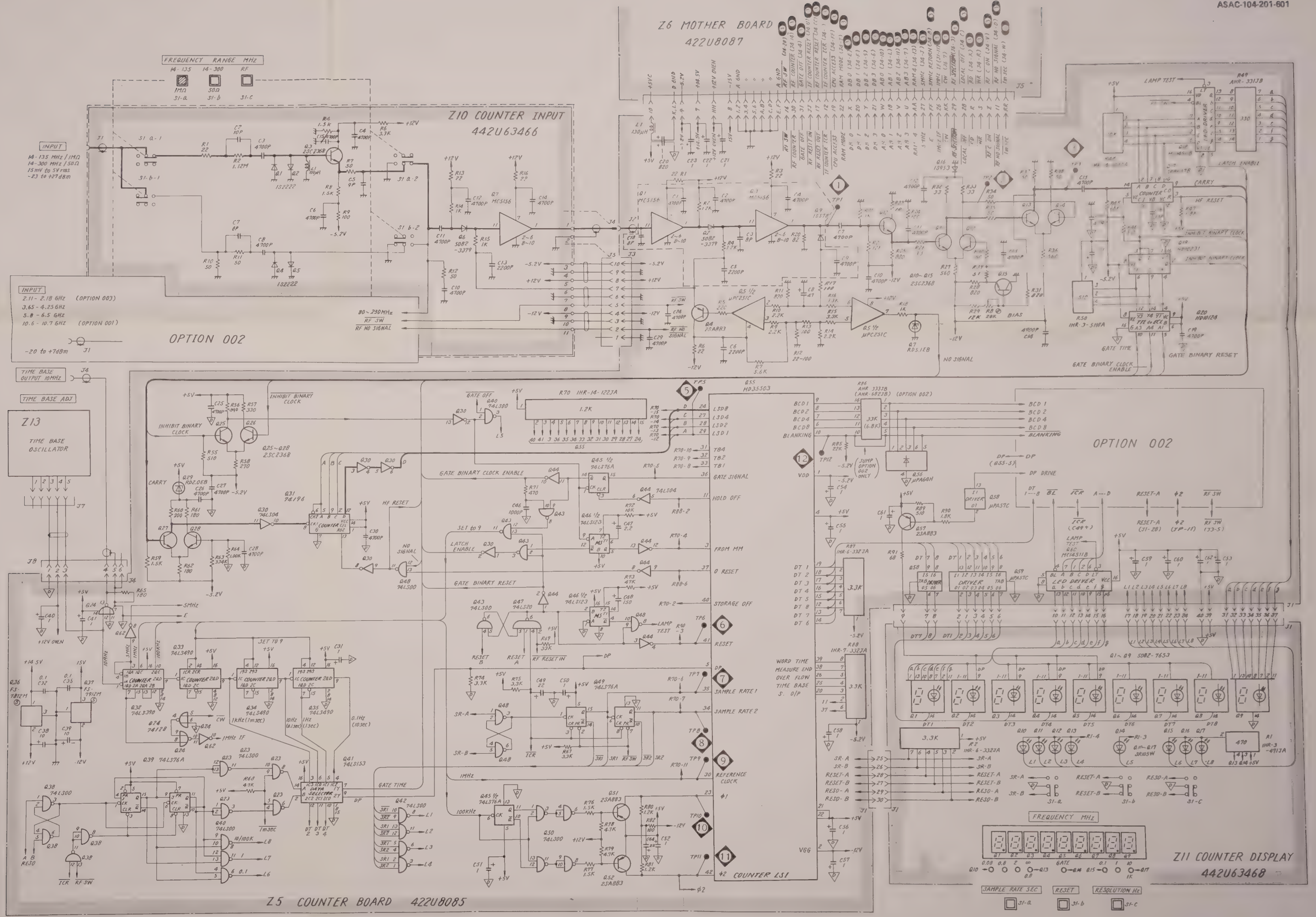


Fig. 27—FREQUENCY COUNTER (4)

5. POWER METER AND DIGITAL VOLTMETER

A. Power Meter Circuit Description

5.01 The input signal applied to the Power Head is detected by a crystal diode sensor, and its output is amplified, digitalized and displayed on the digital indicator with a resolutio of 0.01 dB.

The power head (detector) is calibrated by the output of an internal reference oscillator. Data processing related to the conversion from detected output to input power, autoranging control, and zero setting are program controlled by a microprocessor (CPU).

In the high input level ranges, amplitude response of input power is simultaneously displayed on the CRT.

The power meter is shown in the block diagram in Fig. 28.

At the power head the applied power is detected by a crystal diode. In the low input level ranges below −12dBm, the output DC component is amplified by an FET chopper modulated type DC amplifier (part of the power head and part of the Z8 Amplifier and sent to Z15 (IF)/Z16 (RF) Linearizer.). The gain of the chopper amplifier section is switchable in three 10dB steps.

In the high input level range above −12dBm, the detected output is amplified by a low noise operational amplifier in the power head, and then further amplified by the other operational amplifier in Z15 (IF)/Z16 (RF). Selection of the amplifier and its gain are controlled by the CPU so that the amplifier is operated in a suitable range.

The output from Z15(Z16) is simultaneously applied to the input of the A/D converter in Z7 A/D Interfare and to the input of the LOG AMP in Z8 Amplifier. The digital output of the A/D converter is sent to the CPU and used in input power calculation. The output of the LOG AMP is sent back to the linearity compensation circuit in the Z15 (IF) or Z16 (RF) Linearizer, and linearized to the logarithm of the input power. The linearized output is displayed on the peaking meter through Z7 and is applied to the amplitude response display circuit of Z5 in the amplitude response measuring range (from −12dBm to +10dBm). Z7 also includes a D/A converter that generates the voltage to cancel the off-set voltage at the input of the amplifier and its interface circuit to the CPU which are used in ZERO SET process.

For temperature compensation of detector diode sensitivity, another diode is contained as a temperature sensor in the each Power Head. Constant current is supplied from Z8 to this diode, and the voltage across the diode is amplified by the operational amplifier in the Z15 or Z16. The output of the operational amplifier is sent to the A/D converter in the Z7 through analog multiplexer, and used as a temperature information by the CPU.

The Z6 CPU Board includes a microprocessor, program memory (ROM), data memory (RAM), and I/O port control circuit. It controls the operation of the power meter section. The CPU is programmed so that the proper operation is performed by originating the interrupt when the state of the power head selector switch (IF, RF switching), ZERO SET switch, CAL switch, RETURN LOSS switch, or SPECTRUM switch on the panel is changed.

The Z12 LED Board contains a circuit that decodes the display data output from the CPU and drives the LED numerical display. The Z9 Connector Board distributes the signals of the IF and RF power heads and interfaces with the switching circuit of the Z1 Mother (interconnection) Board. The S2 Digital Switch sets the value of the CORRECTION FACTOR. The interface circuit between this switch and the CPU is in Z6. Z10 Reference OSC is a 50MHz oscillator with ALC that generates the reference level (0dBm) signal for power head calibration. This oscillator operates when the CAL switch on the front panel or CAL OUTPUT switch on the rear panel is pushed.

B. Digital Voltmeter (DVM) Circuit Description

5.02 The input dc voltage is divided by resistance attenuator (1/400) and added to the differential amplifier consisting of two operational amplifiers. The output of the differential amplifier is sent through the analog multiplexer and programmable attenuator to the A/D converter. The digitalized output of the A/D converter is processed and displayed on the digital display at the front panel, under the control of the microprocessor. At the begining of the every measurement cycle, the input of the differential amplifier is grounded, and offset voltage is sampled. This offset voltage is subtrcuted from the measured input voltage value at the end of measurement cycle. Thus offset error of input amplifier is canceled.

These circuits are contained in the A/D Interface Board (Z7) and CPU Board (Z6), which are described in item A, Power Meter.

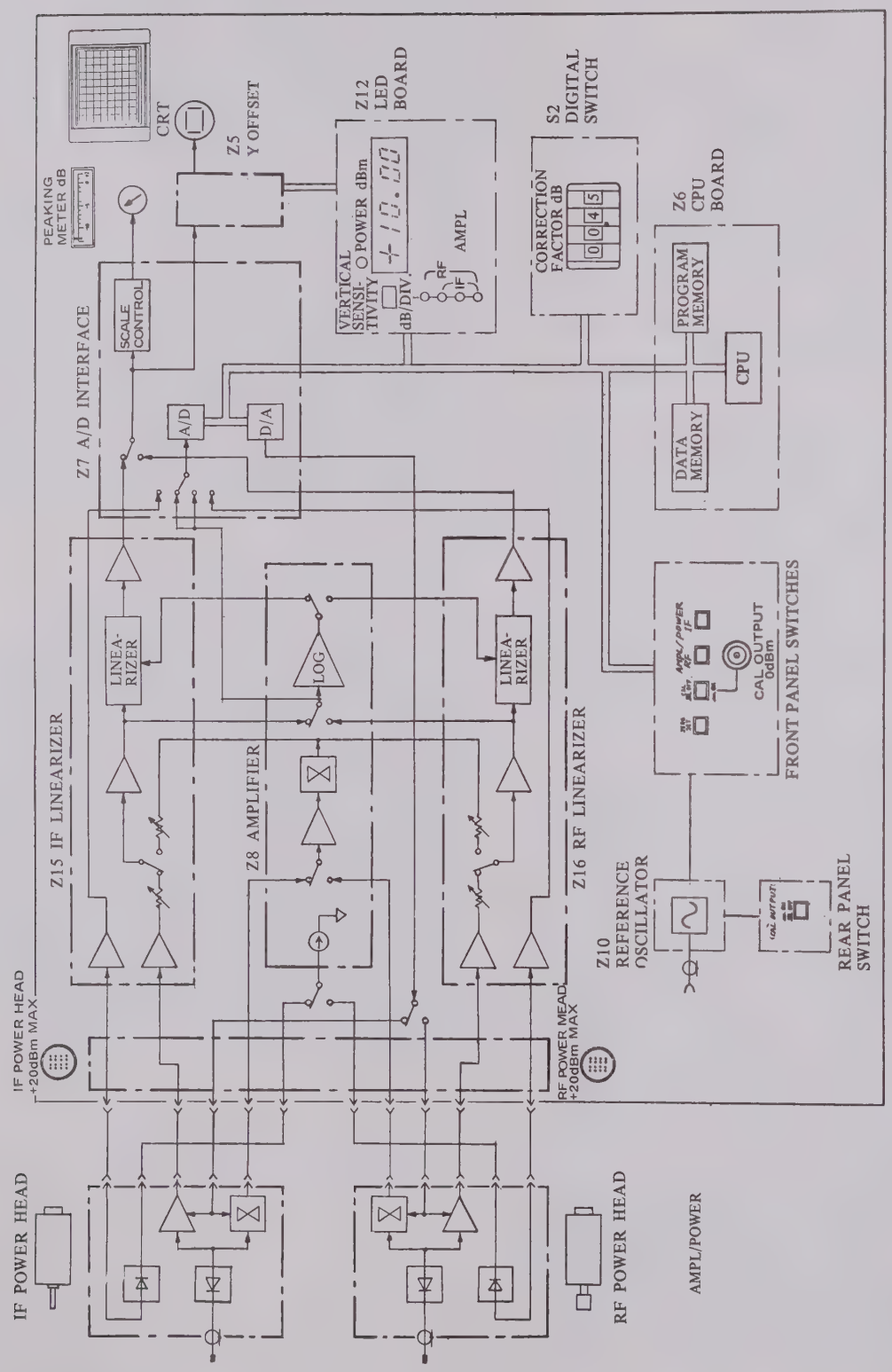


Fig. 28--Power Meter Block Diagram

C. Power Meter Troubleshooting

5.03 Since the CPU is related to operations in each paragraph, whether the cause of the trouble is in the hardware or in the program control (CPU or program memory) must first be determined. Then, the defective unit is isolated according to the check procedure described below, and hardware checks are performed by referring to the check points shown in the Figs. 37, 38 circuit diagrams.

When the cause is suspected to be in the program control section the Z6 CPU board should be replaced.

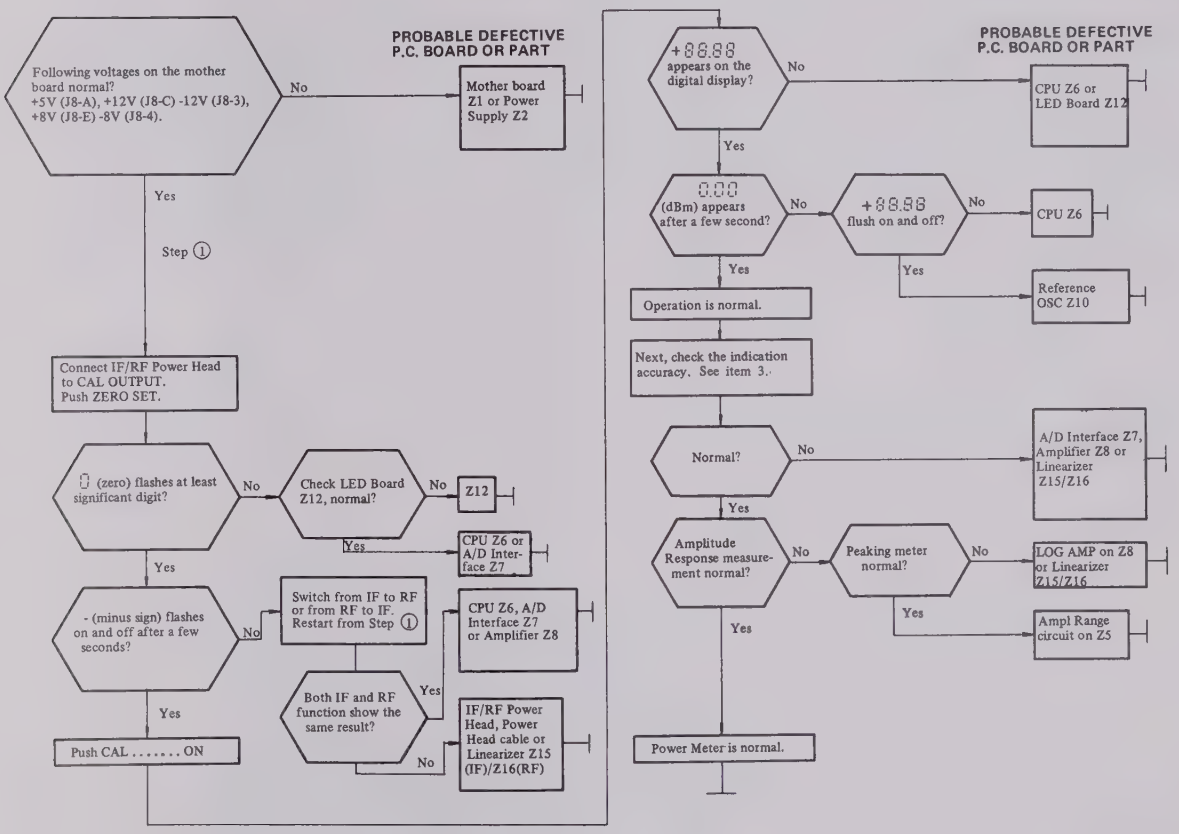

PROBABLE DEFECTIVE P.C. BOARD OR PART
Following voltages on the mother board normal? +5V (J8-A), +12V (J8-C) -12V (J8-3), +8V (J8-E) -8V (J8-4).
No
Mother board Z1 or Power Supply Z2
Yes
Step ①
Connect IF/RF Power Head to CAL OUTPUT. Push ZERO SET.
0 (zero) flashes at least significant digit?
No
Check LED Board Z12, normal?
No
Z12
Yes
CPU Z6 or A/D Interface Z7
Yes
- (minus sign) flashes on and off after a few seconds?
No
Switch from IF to RF or from RF to IF. Restart from Step ①
CPU Z6, A/D Interface Z7 or Amplifier Z8
Yes
Both IF and RF function show the same result?
Yes
IF/RF Power Head, Power Head cable or Linearizer Z15 (IF)/Z16(RF)
No
Push CAL ..... ON
PROBABLE DEFECTIVE P.C. BOARD OR PART
+88.88 appears on the digital display?
No
CPU Z6 or LED Board Z12
Yes
0.00 (dBm) appears after a few second?
No
+88.88 flush on and off?
No
CPU Z6
Yes
Yes
Reference OSC Z10
Operation is normal.
Next, check the indication accuracy. See item 3.
Normal?
No
A/D Interface Z7, Amplifier Z8 or Linearizer Z15/Z16
Yes
Amplitude Response measurement normal?
No
Peaking meter normal?
No
LOG AMP on Z8 or Linearizer Z15/Z16
Yes
Ampl Range circuit on Z5
Yes
Power Meter is normal.

Fig. 29—Power Meter Troubleshooting Flow Chart

D. Digital Voltmeter Troubleshooting

5.04 This paragraph describes the method of isolating the P.C. board in which trouble has occurred. Determine the defective P.C. board or part by the flow chart in Fig. 30.

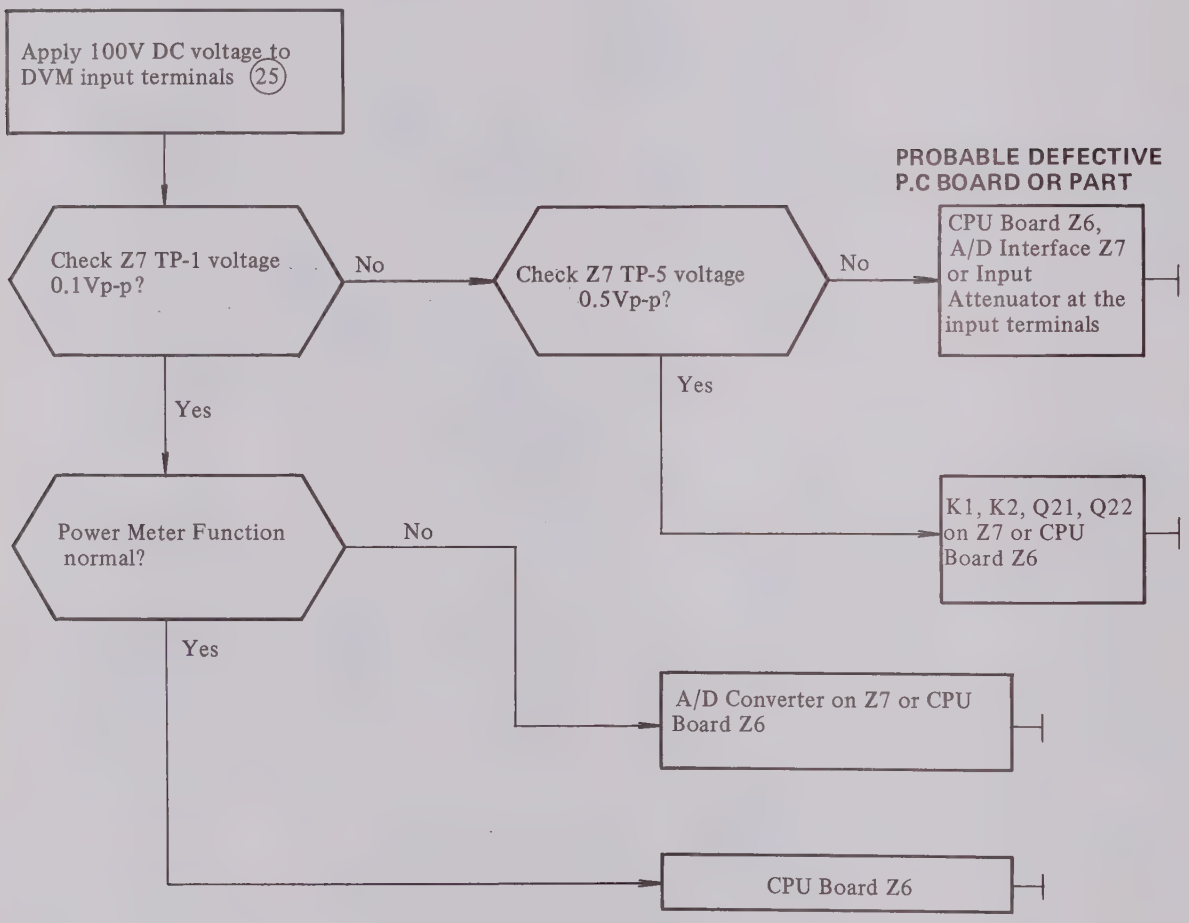
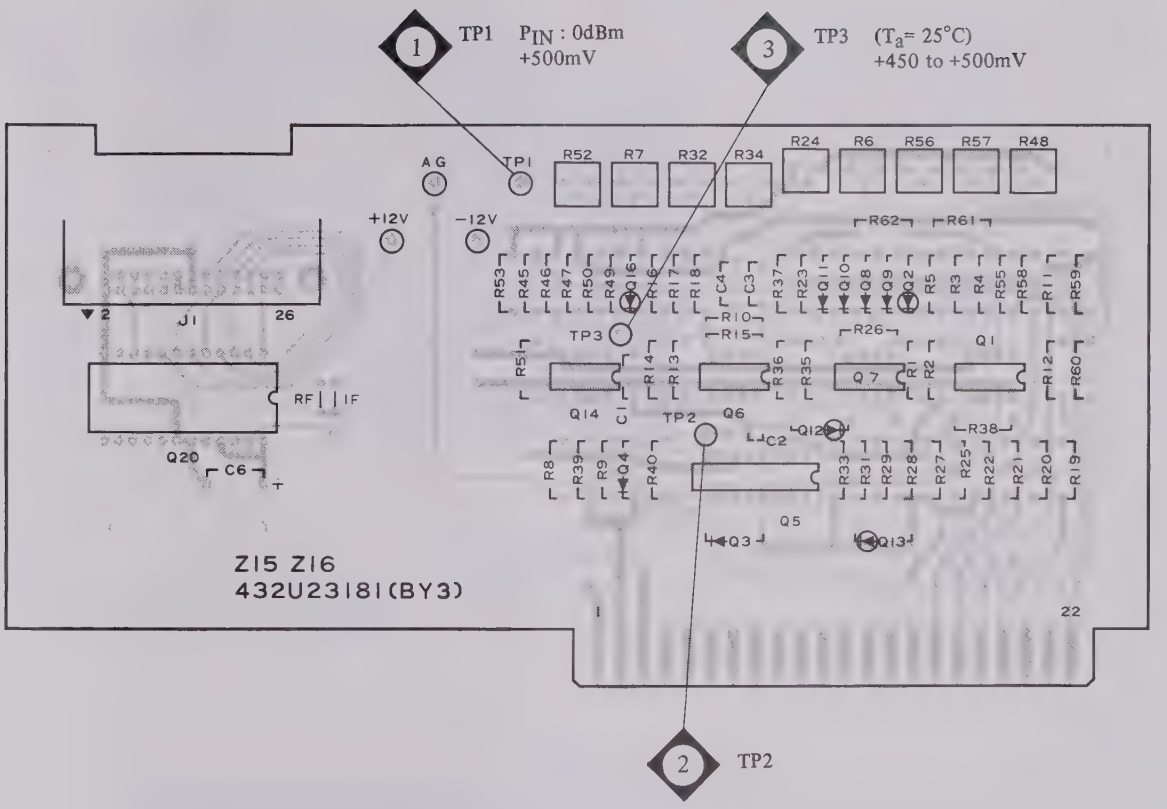

Apply 100V DC voltage to DVM input terminals (25)
PROBABLE DEFECTIVE P.C BOARD OR PART
Check Z7 TP-1 voltage 0.1Vp-p?
No
Check Z7 TP-5 voltage 0.5Vp-p?
No
CPU Board Z6, A/D Interface Z7 or Input Attenuator at the input terminals
Yes
Yes
K1, K2, Q21, Q22 on Z7 or CPU Board Z6
Power Meter Function normal?
No
Yes
A/D Converter on Z7 or CPU Board Z6
CPU Board Z6

Fig. 30—Digital Voltmeter Troubleshooting Flow Chart

Z15, Z16 IF/RF LINEARIZER



P_{IN} (dBm)	V_{TP2} (V)
−10	−1
0	0
+10	+1

Fig. 31—Power Meter Test Points

Z12 LED BOARD

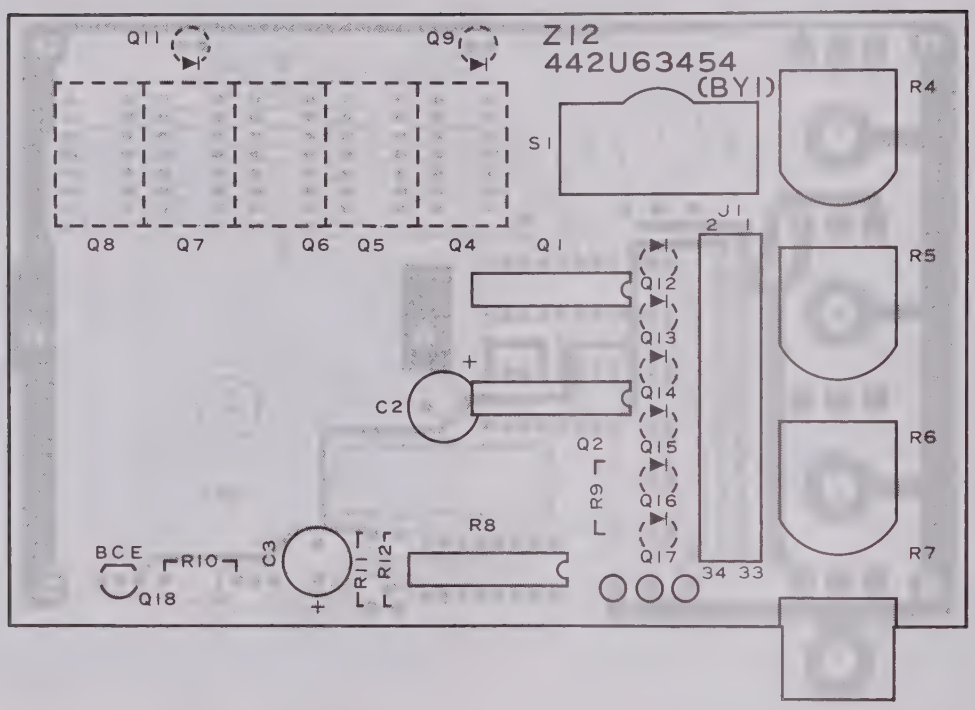
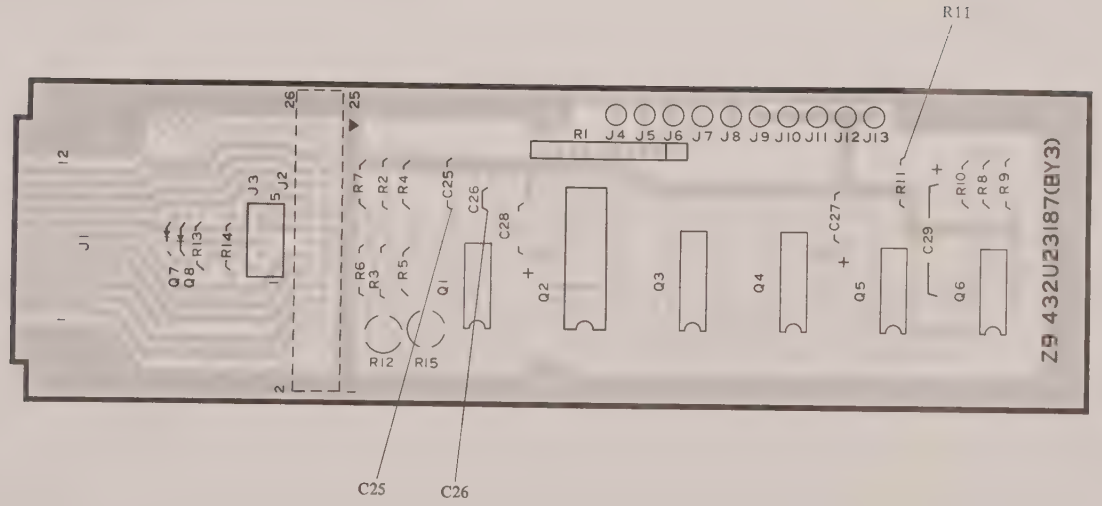


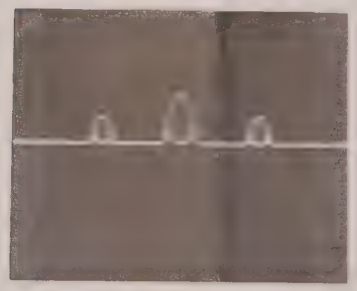
Fig. 32—Power Meter Test Point

Z9 MARKER DELAY

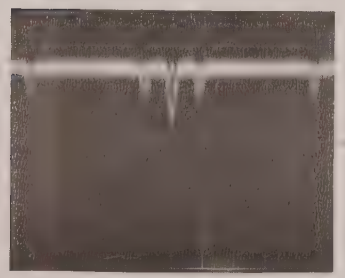


Marker waveforms at R11, C25 and C26 are observed under following conditions.

SWEEP WIDTH: 70MHz ±2MHz
MARKER FREQUENCY: ±1MHz

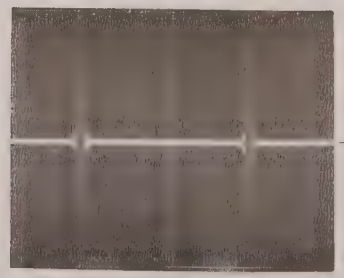


R11 [Center Marker and Side Marker]



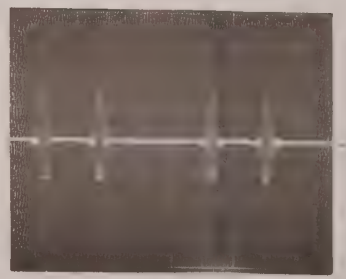
Ⓥ : 50mV/div
Ⓗ : 2msec/div

C25 [Center Marker]



Ⓥ : 0.2V/div
Ⓗ : 2msec/div

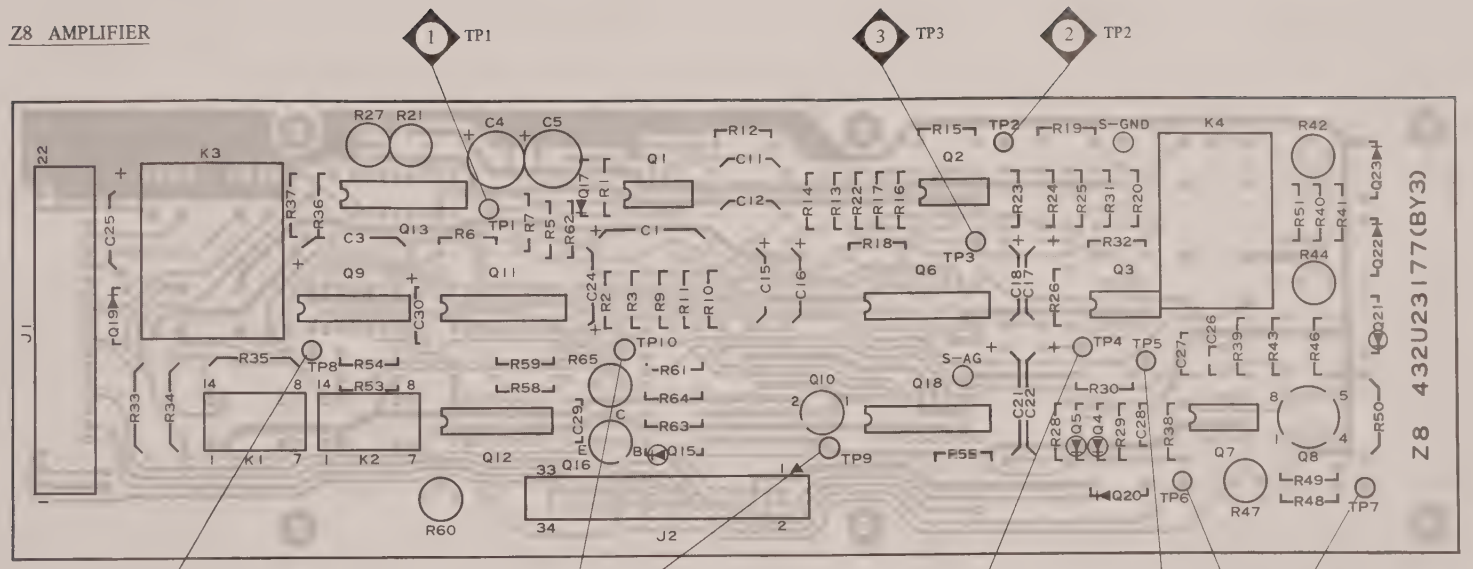
C26 [±1MHz, Side Marker]

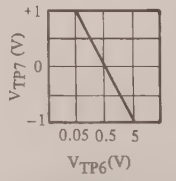


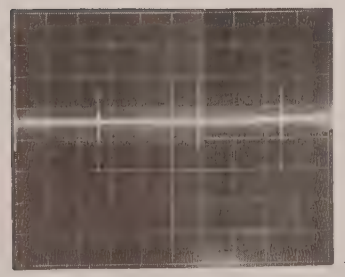
Ⓥ : 0.5V/div
Ⓗ : 2msec/div

Fig. 33—Marker Delay Test Points

Z8 AMPLIFIER

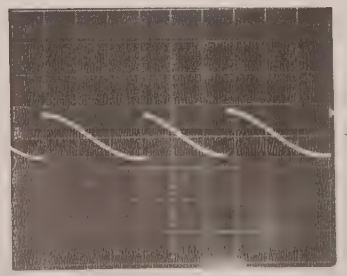






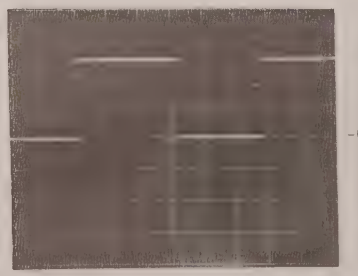
TP1
Ⓥ 20mV/div
Ⓗ 0.5msec/div

P_{IN} = −20dBm

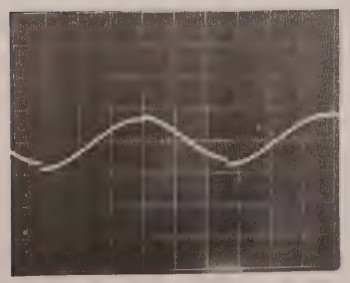


TP3
Ⓥ 100mV/div
Ⓗ 0.5msec/div

P_{IN} = −20dBm

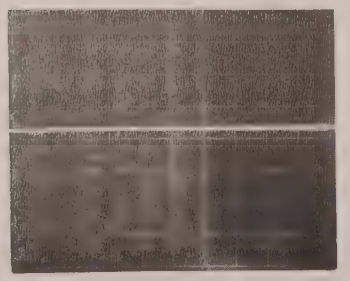


TP8
Ⓥ 2V/div
Ⓗ 0.5msec/div



TP2
Ⓥ 100mV/div
Ⓗ 0.5msec/div

P_{IN} = −20dBm

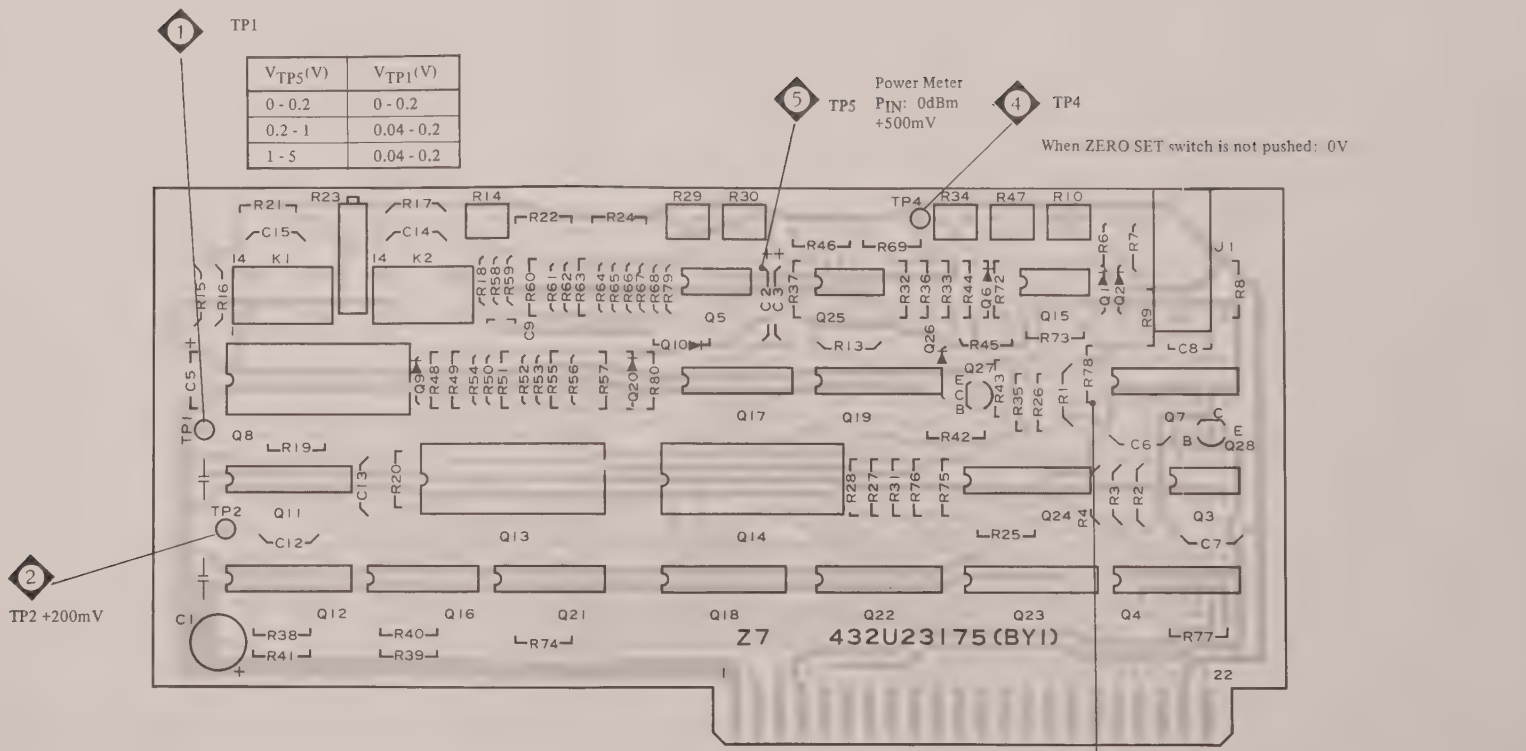


TP4
Ⓥ 200mV/div
Ⓕ 0.5msec/div

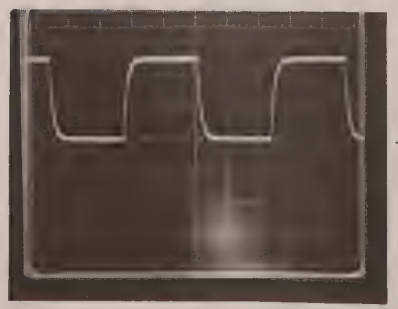
(Photo for IF, typical, for RF −430mV DC is typical. P_{IN} = −20dBm)

Fig. 34—Power Meter Test Points

Z7 A/D INTERFACE

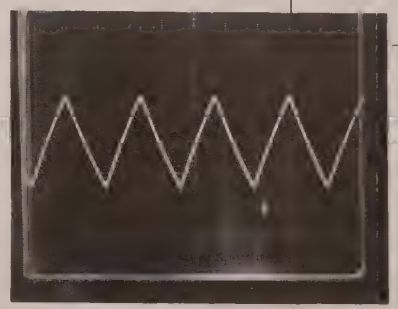


V_{TP5}(V)	V_{TP1}(V)
0 - 0.2	0 - 0.2
0.2 - 1	0.04 - 0.2
1 - 5	0.04 - 0.2



TP5
DVM operation
Input voltage: +100V

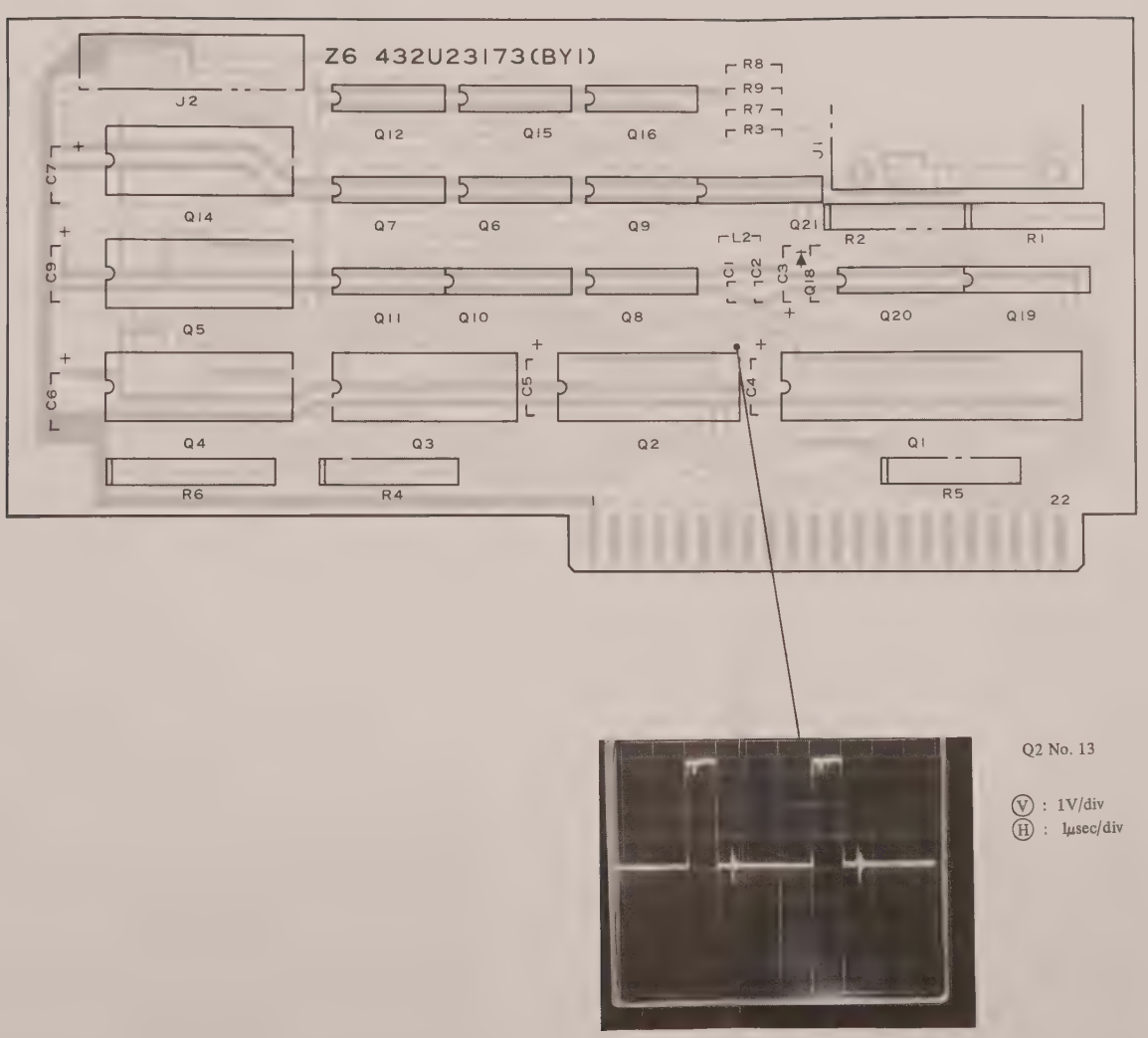
Ⓥ : 0.2V/div
Ⓗ : 0.1sec/div



Q28-E
(Connecting point of R78 and C8)

Ⓥ : 0.5V/div
Ⓗ : 1μsec/div

Fig. 35—Power Meter Test Points



Q2 No. 13

Ⓥ : 1V/div
Ⓗ : 1μsec/div

Fig. 36—Power Meter Test Points

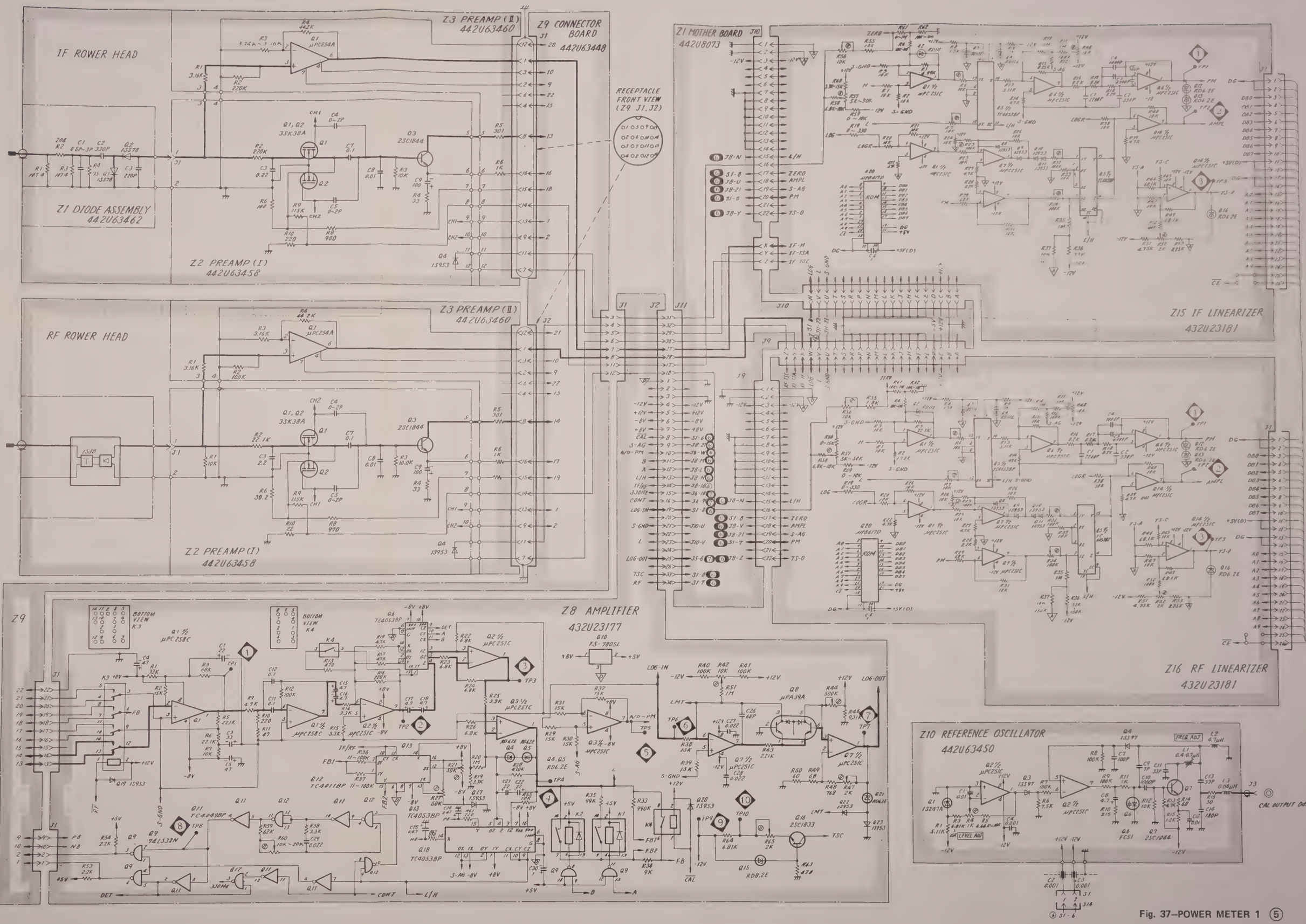


Fig. 37—POWER METER 1 ⑤

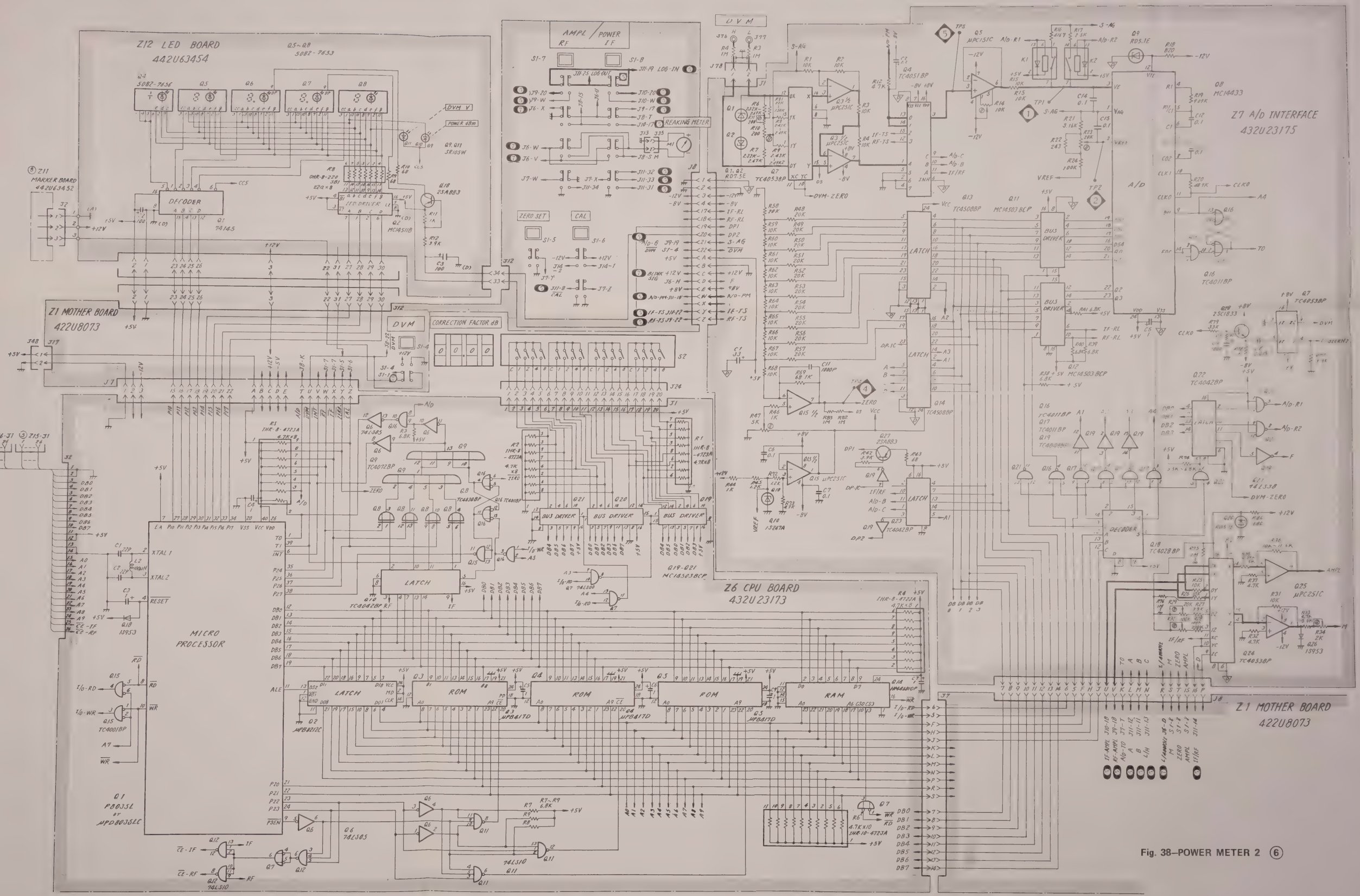


Fig. 38–POWER METER 2 (6)

6. CRT CIRCUIT AND POWER SUPPLY

A. CRT Circuit Description

6.01 The block diagram is shown in Fig. 39. The CRT circuit consists of a CRT and two printed circuit boards (CRT BIAS Z3 and PRE-AMP Z13). The vertical axis signal is selected by the EXT and INT switching circuits (Z13) and the signal is fed to the input of pre-amplifier. This pre-amplifier operates as a balancing amplifeir for extemal signals, and as an adder-amplifier between amplitude or return loss response and marker signals for internal signals.

The pre-amplifier output signal is amplified in the Z3 main amplifier and drives the CRT vertical axis. Two horizontal signals; the internal signal (46Hz sine wave for amplitude, return loss and 5Hz sawtooth wave for IF spectrum), and the external signal are selectable by the Z13 switching circuits, depending upon application. These signals are amplified by the Main Amplifier (Z3) and drive the CRT horizontal axis. The CRT high voltage is obtained by the Z3 DC to DC converter.

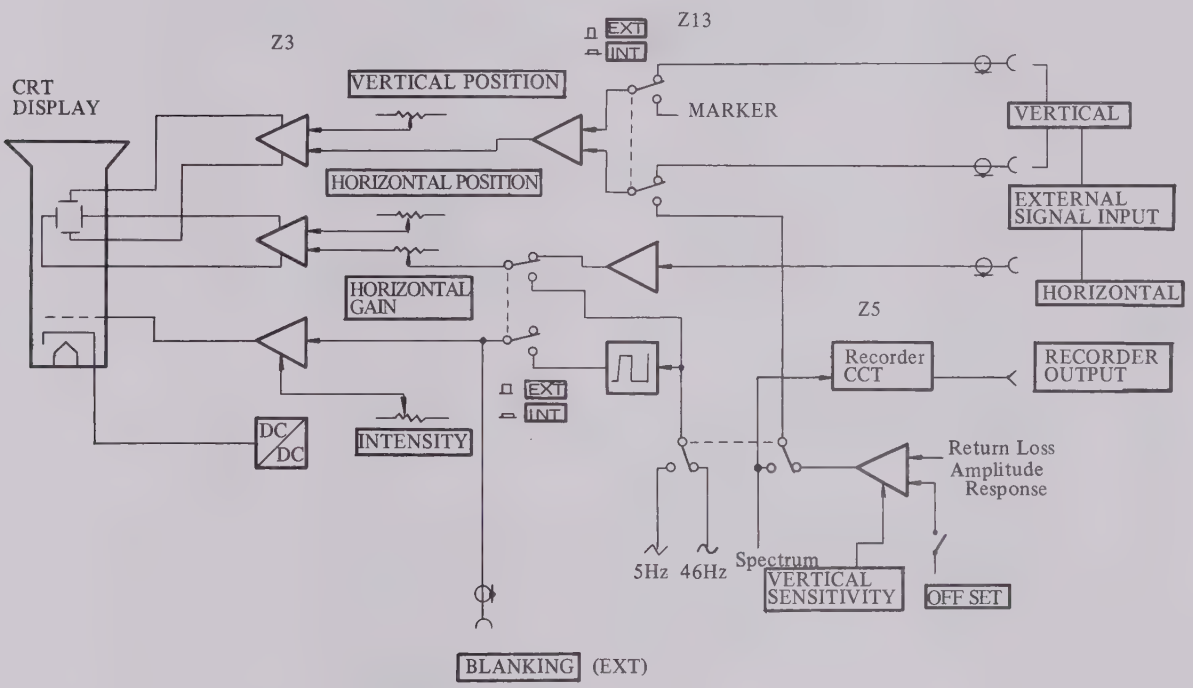


Fig. 39—CRT Circuit Block Diagram

B. Power Supply Circuit Description

6.02 The DC voltages in this equipment are the OVEN power supply and other circuit power supplies. The OVEN power is supplied through F3, F4 (10A) → the 0.5A line fuse → T2 → Q7, and operates immediately when the power cable is connected to the line (115 ±12V). The other power supplies are fed through F3, F4 (10A) → the 5A line fuse → power switch → T1 → Z2 → Z13. The power supply block diagram is shown in Fig. 40.

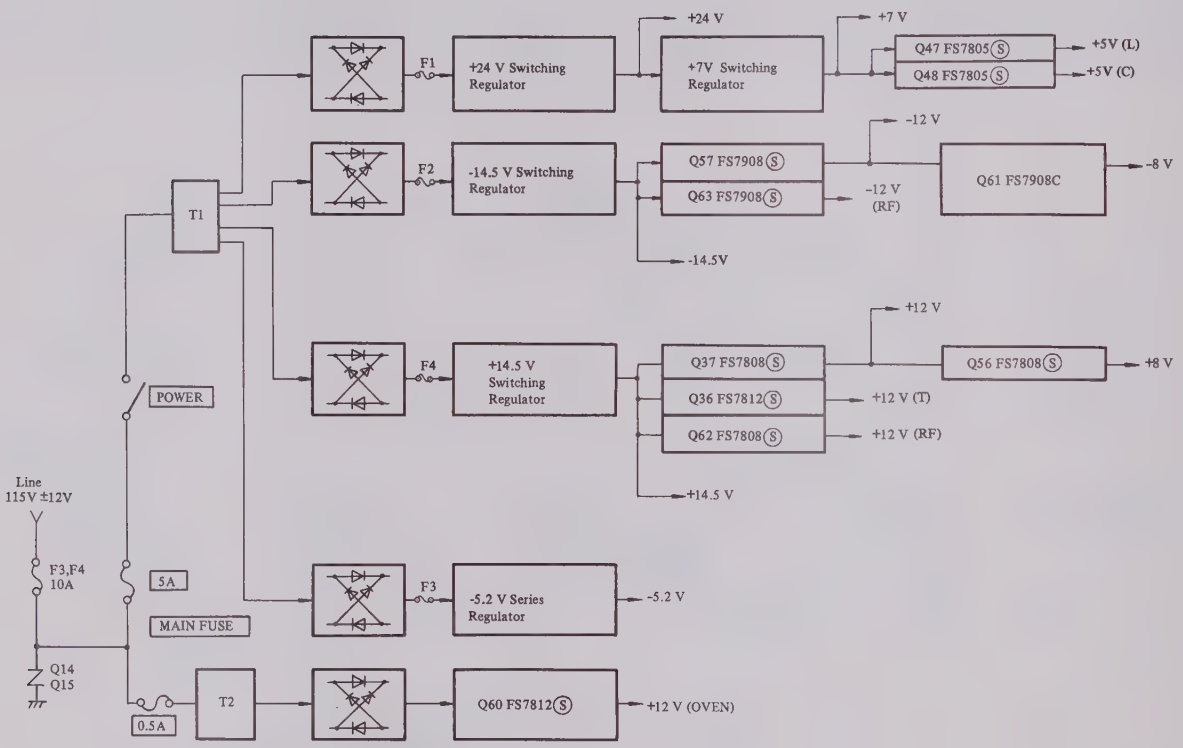


Fig. 40—Power Supply Block Diagram

C. CRT Circuit Troubleshooting

6.03 This paragraph describes the method of isolating the P.C. board in which trouble has occured. Determine the defective board or part by the flow chart in Fig. 41.

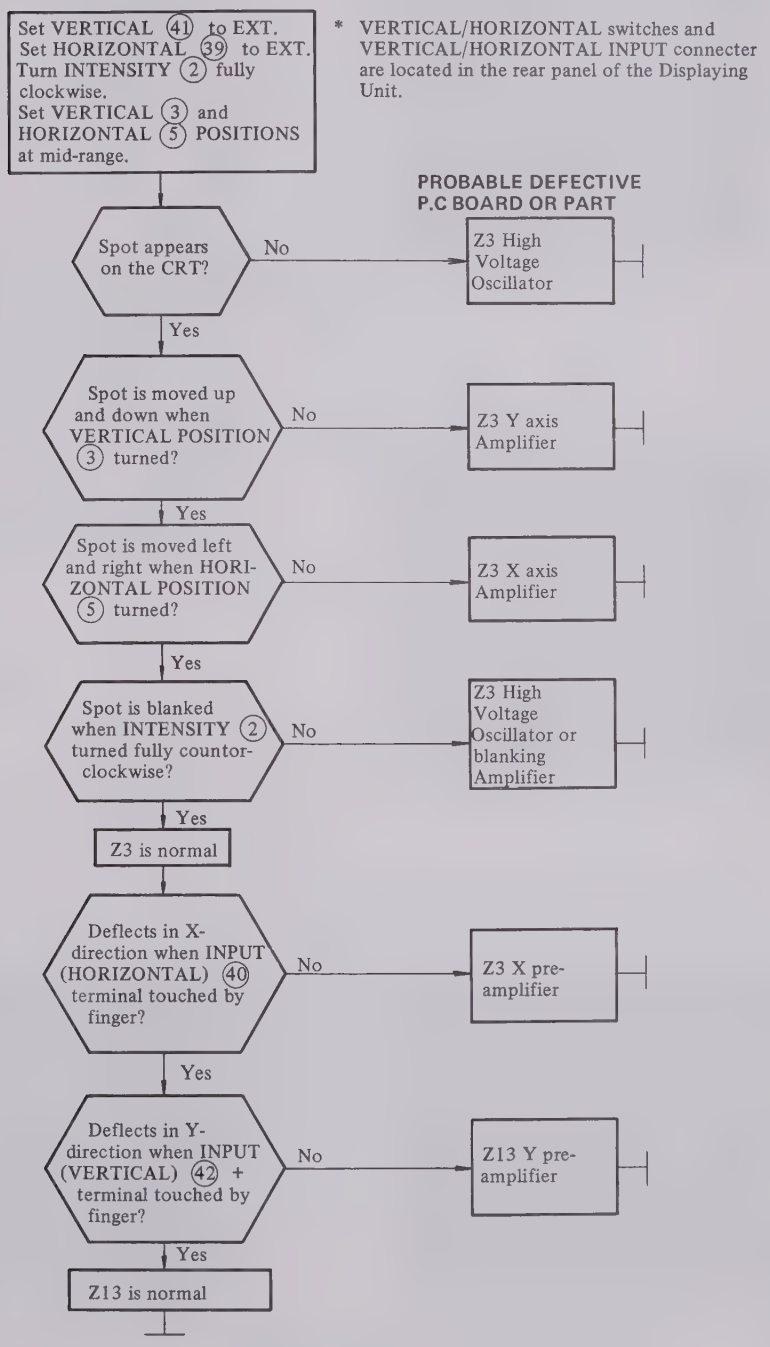

Set VERTICAL (41) to EXT.
Set HORIZONTAL (39) to EXT.
Turn INTENSITY (2) fully clockwise.
Set VERTICAL (3) and HORIZONTAL (5) POSITIONS at mid-range.
* VERTICAL/HORIZONTAL switches and VERTICAL/HORIZONTAL INPUT connecter are located in the rear panel of the Displaying Unit.
PROBABLE DEFECTIVE P.C BOARD OR PART
Spot appears on the CRT?
No
Z3 High Voltage Oscillator
Yes
Spot is moved up and down when VERTICAL POSITION (3) turned?
No
Z3 Y axis Amplifier
Yes
Spot is moved left and right when HORIZONTAL POSITION (5) turned?
No
Z3 X axis Amplifier
Yes
Spot is blanked when INTENSITY (2) turned fully countor-clockwise?
No
Z3 High Voltage Oscillator or blanking Amplifier
Yes
Z3 is normal
Deflects in X-direction when INPUT (HORIZONTAL) (40) terminal touched by finger?
No
Z3 X pre-amplifier
Yes
Deflects in Y-direction when INPUT (VERTICAL) (42) + terminal touched by finger?
No
Z13 Y pre-amplifier
Yes
Z13 is normal

Fig. 41—CRT Circuit Troubleshooting Flow Chart

D. Power Supply Troubleshooting

6.04 This paragraph describes the method of isolating the unit in which trouble has occured. Determine the defective board or unit by the flow chart in Fig. 42.

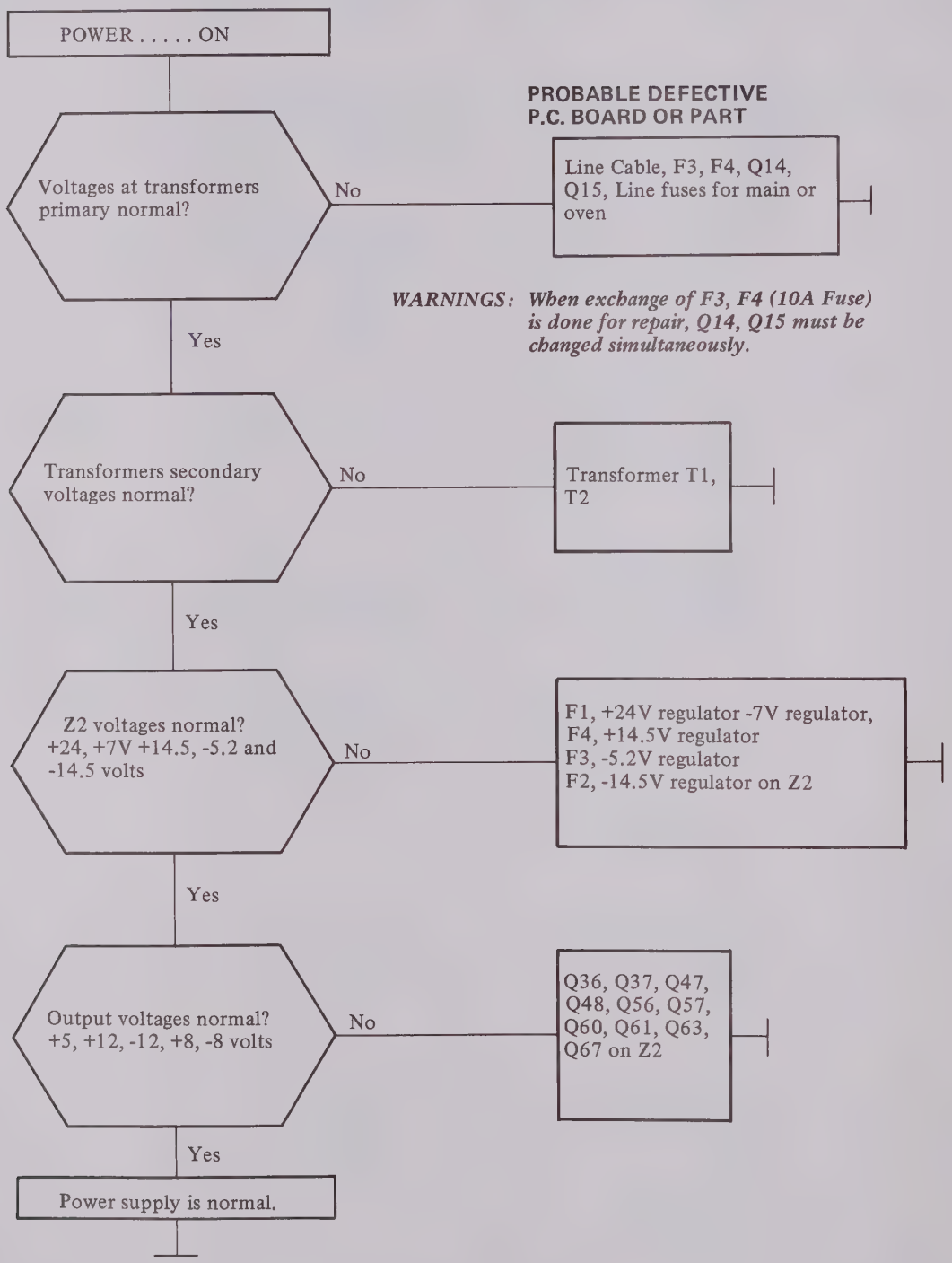
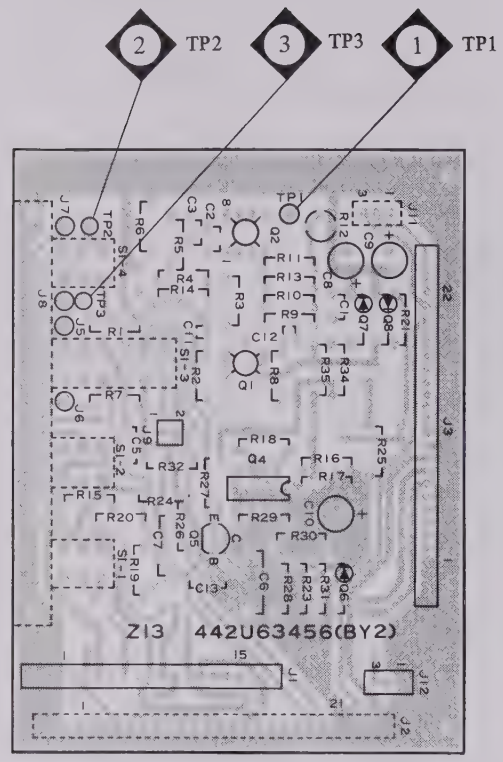

POWER . . . . . ON
PROBABLE DEFECTIVE P.C. BOARD OR PART
Voltages at transformers primary normal?
No
Line Cable, F3, F4, Q14, Q15, Line fuses for main or oven
WARNINGS: When exchange of F3, F4 (10A Fuse) is done for repair, Q14, Q15 must be changed simultaneously.
Yes
Transformers secondary voltages normal?
No
Transformer T1, T2
Yes
Z2 voltages normal? +24, +7V +14.5, -5.2 and -14.5 volts
No
F1, +24V regulator -7V regulator,
F4, +14.5V regulator
F3, -5.2V regulator
F2, -14.5V regulator on Z2
Yes
Output voltages normal? +5, +12, -12, +8, -8 volts
No
Q36, Q37, Q47, Q48, Q56, Q57, Q60, Q61, Q63, Q67 on Z2
Yes
Power supply is normal.

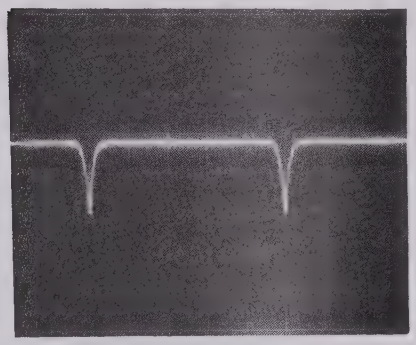
Fig. 42—Power Supply Troubleshooting Flow Chart

Z13 PRE AMP



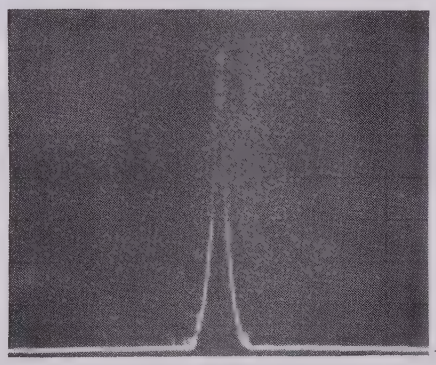
TP1 When push SPECTRUM (22) INT (39) (41)

[Input Signal: 70MHz 0dBm
SCAN WIDTH: 70MHz ±1MHz]



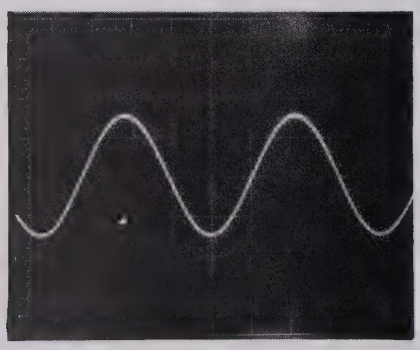
Ⓥ : 1V/div
Ⓗ : 20msec/div

Waveform corresponding to TP1



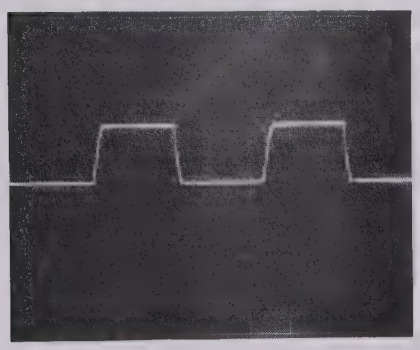
Ⓥ : 10dB/div
Ⓗ : 200kHz/div

TP2 When Push DVM (24) INT (39) (41)



Ⓥ : 2V/div
Ⓗ : 5msec/div

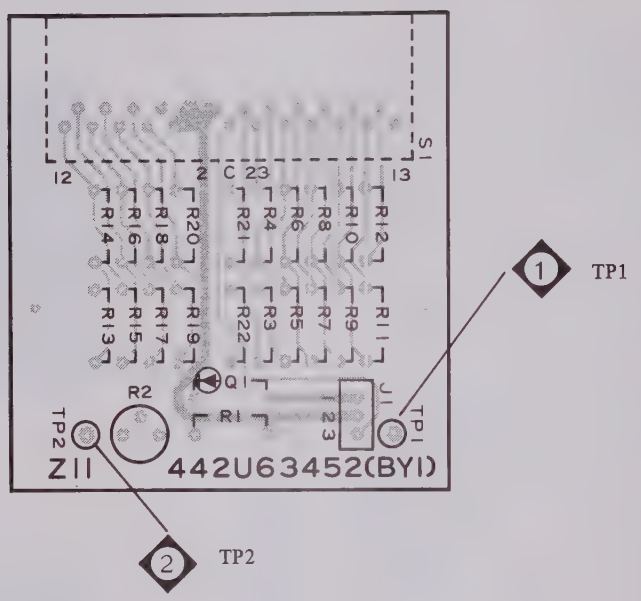
TP3 When Push DVM (24) INT (39) (41)



Ⓥ : 2V/div
Ⓗ : 5msec/div

Fig. 43—CRT, Power Source Test Points

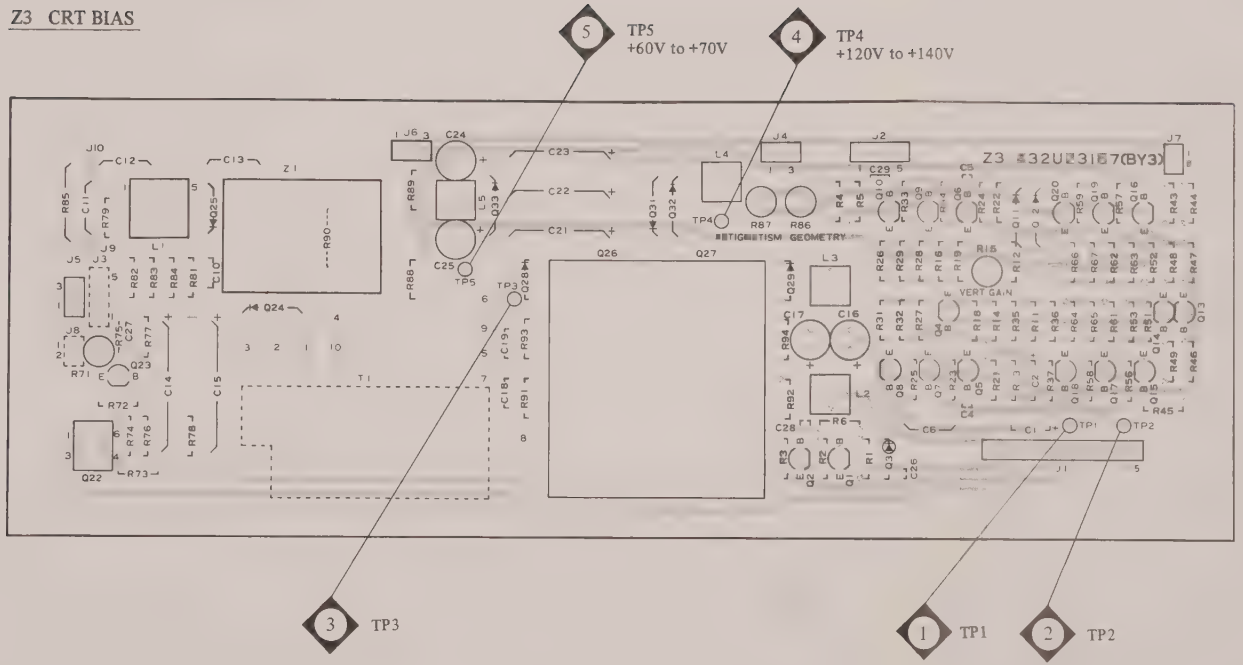
Z11 MARKER BOARD



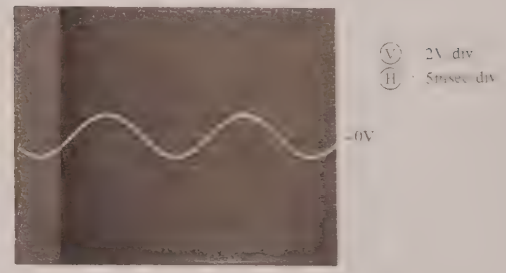
MARKER FREQUENCY ±MHz	TP_1 Voltage (±0.1%)	TP_2 Voltage (±0.1%)
OFF	+12V	
1	+0.25V	
2	+0.5V	
3	+0.75V	
4	+1.0V	
5	+1.25V	
6	+1.5V	
7	+1.75V	
8	+2.0V	
9	+2.25V	5.0V
10	+2.5V	
11	+2.75V	
12	+3.0V	
13	+3.25V	
14	+3.5V	
15	+3.75V	
16	+4.0V	
17	+4.25V	
18	+4.5V	
19	+4.75V	
20	+5.0V	

Fig. 44—CRT, Power Source Test Points

Z3 CRT BIAS

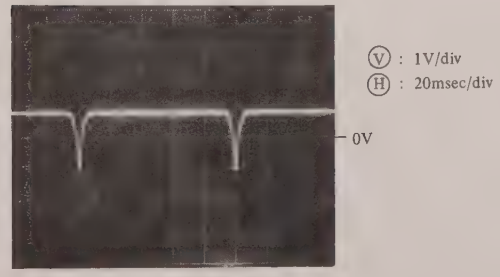


TP2 When push DVM (24), INT (39) (41)

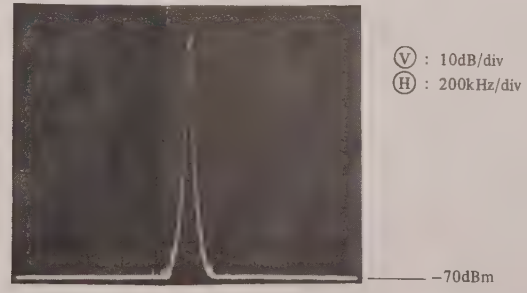


When push SPECTRUM (22), INT (39) (41)

TP1 Input Signal: 70MHz 0dBm
Scan width: 70MHz ±1MHz



Waveform corresponding to TP1



TP3

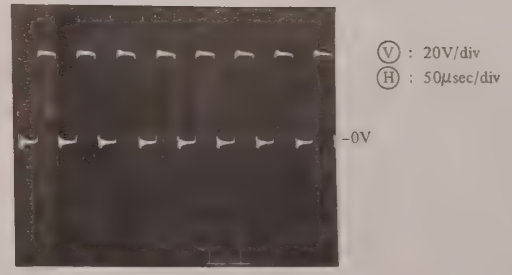
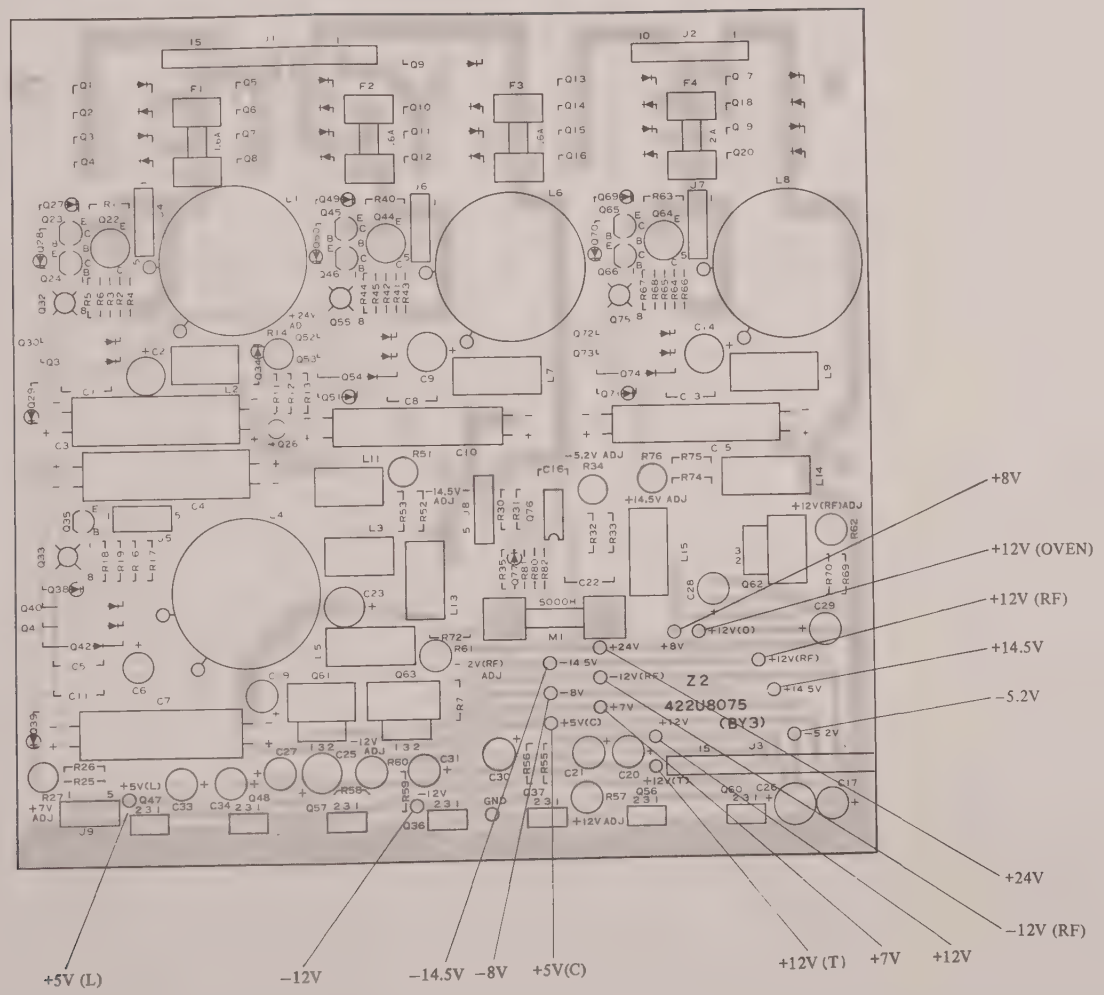


Fig. 45—CRT, Power Source Test Points

Z2 POWER SOURCE



Voltage	Range	Max Ripple Voltage (p-p)
+5V (L)	+4.85V to +5.15V	10mV
−12V	−11.9V to −12.1V	10mV
+8V	+7.7V to +8.3V	10mV
+12V (OVEN)	+11.7V to +12.3V	10mV
+12V (RF)	+11.9V to +12.1V	10mV
+14.5V	+14V to +15V	0.5V
−5.2V	−5.1V to −5.3V	50mV
+24V	+22.5V to +25.5V	0.5V
−12V (RF)	−11.9V to −12.1V	10mV
+12V	+11.9V to +12.1V	10mV
+12V (T)	+11.6V to +12.4V	10mV
+7V	+7V to +7.5V	0.1V
−14.5V	−14V to −15V	0.5V
−8V	−7.7V to −8.3V	10mV
+5V (C)	+4.85V to +5.15V	10mV

Fig. 46—CRT, Power Source Test Points

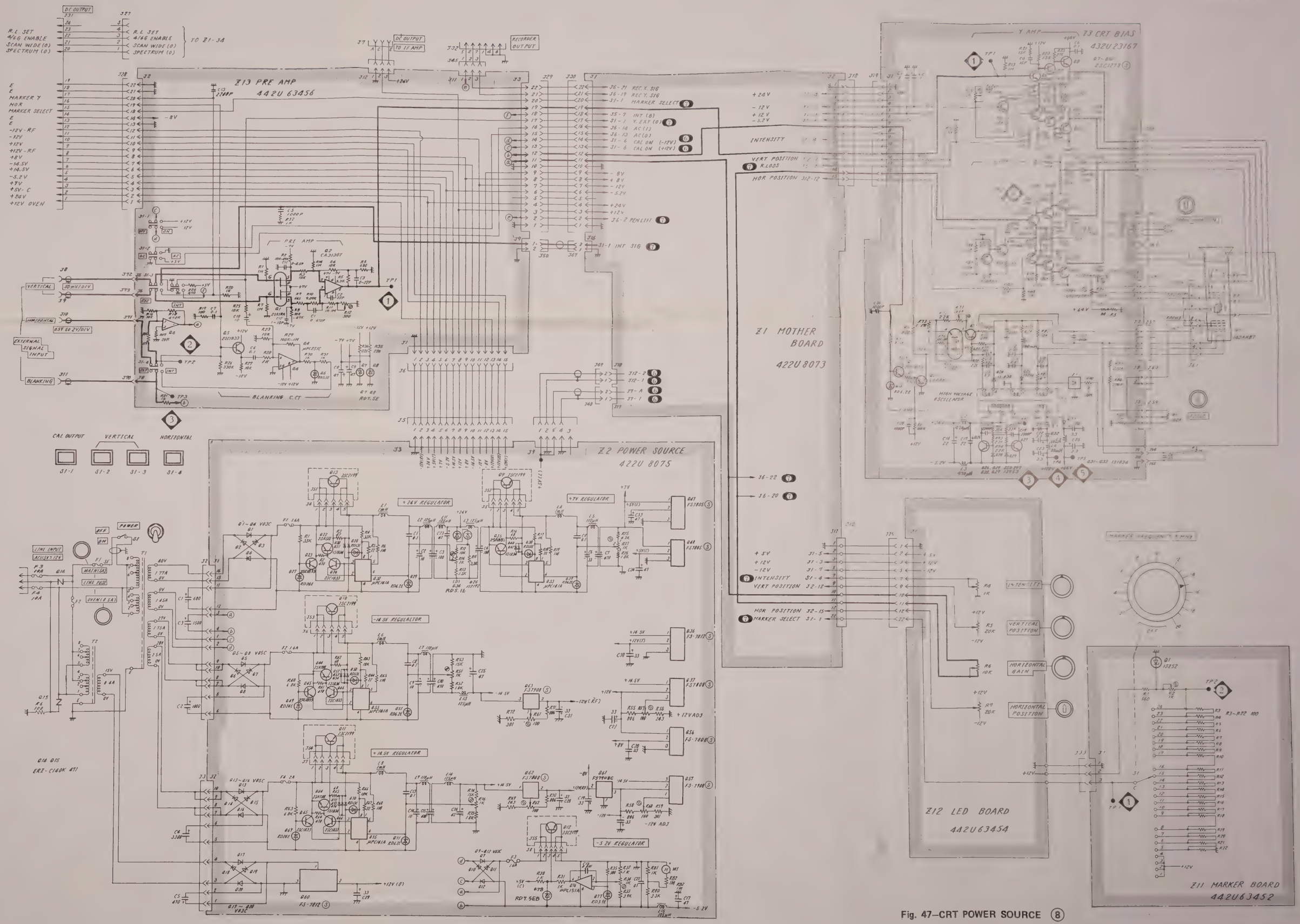


Fig. 47—CRT POWER SOURCE (8)

7. RETURN LOSS, SPECTRUM FUNCTION AND Y OFFSET

A. Return Loss Circuit Description

7.01 Fig. 48 shows a simplified IF/RF return loss block diagram.

In the RF return loss measurement, the detected amplitude-modulation signal is input to the RETURN LOSS RF INPUT terminal. A ranging circuit is included in the 28kHz amplifier, and the 28kHz signal is detected to DC. The return loss is displayed on the CRT through the log amplifier.

In the IF return loss measurement, the IF signal is input to the RETURN LOSS IF INPUT terminal. This signal is fed to the ranging circuit and IF amplifier, and detected to DC. The return loss is displayed on the CRT through the log amplifier.

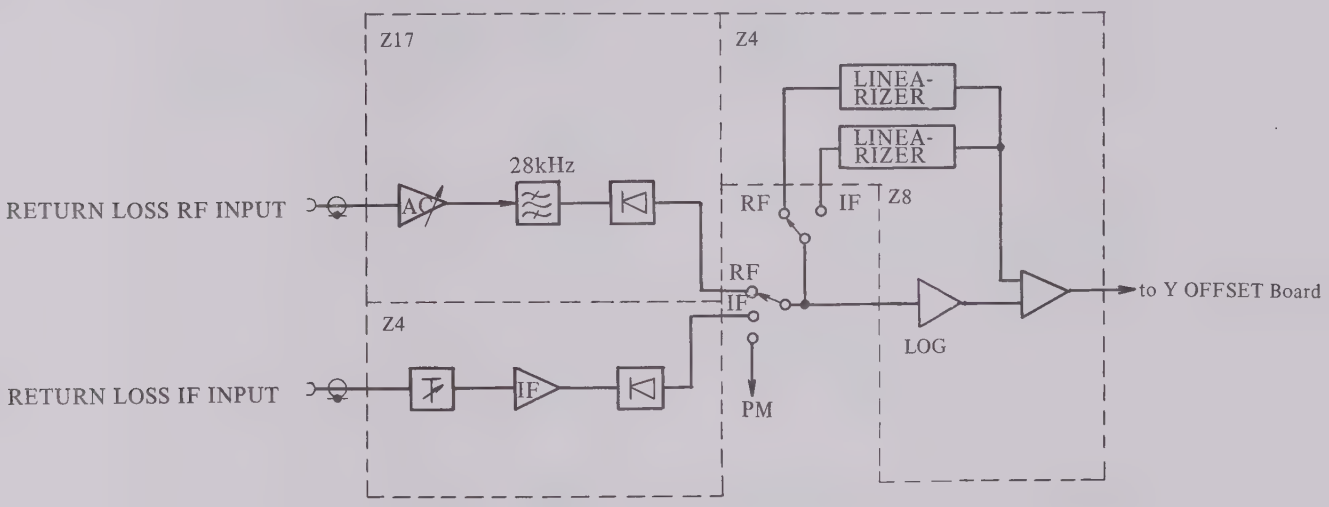
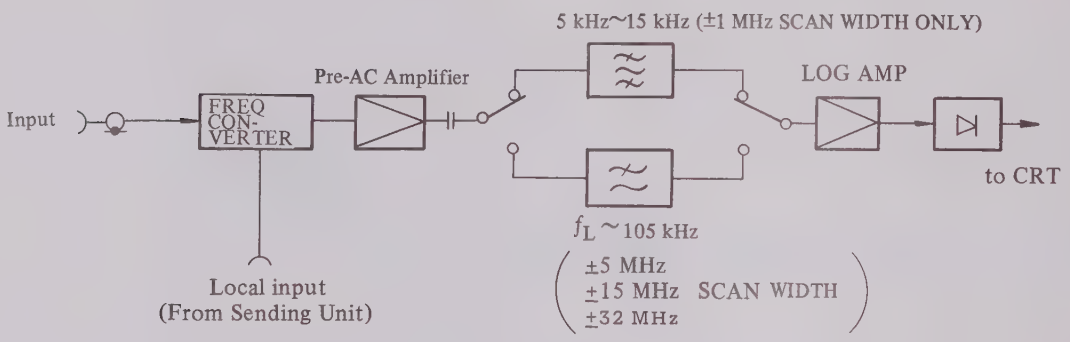


Fig. 48—Return Loss Block Diagram

B. Spectrum Function Circuit Description

7.02 The block diagram is shown in Fig. 49. The Spectrum Circuit (Z14) consists of a frequency converter, pre–AC amplifier, filter, log amplifier, and detector. The measured signal is mixed with the local signal scanned by the frequency converter. Then, only the frequency fixed at the pass band is detected from the conversion frequencies by the Pre-AC AMP and filter. This signal is log-converted by the log amplifier and its level change becomes dB linear. The log amplifier dynamic range is about 70dB.



Note: f_L is determined by the pre-AC amplifier and less than 5 kHz.

Fig. 49–Spectrum Circuit Block Diagram

C. Y OFFSET Circuit Description

7.03 The Z5 Y OFFSET Board consists of gain control, offset control, coupling, and recorder signal generation circuits. The block diagram is shown in Fig. 50. The gain control circuit receives return loss and amplitude response information and controls the gain so that the information can be displayed on the CRT with proper sensitivity.

The offset control circuit functions when the amplitude response in measured at DC coupling, and controls the DC level so that the measured results can be set nearly at the center of the CRT display. The recorder signal generation circuit consists of a circuits for sampling X, Y axis information to record the IF spectrum information in the X-Y recorder.

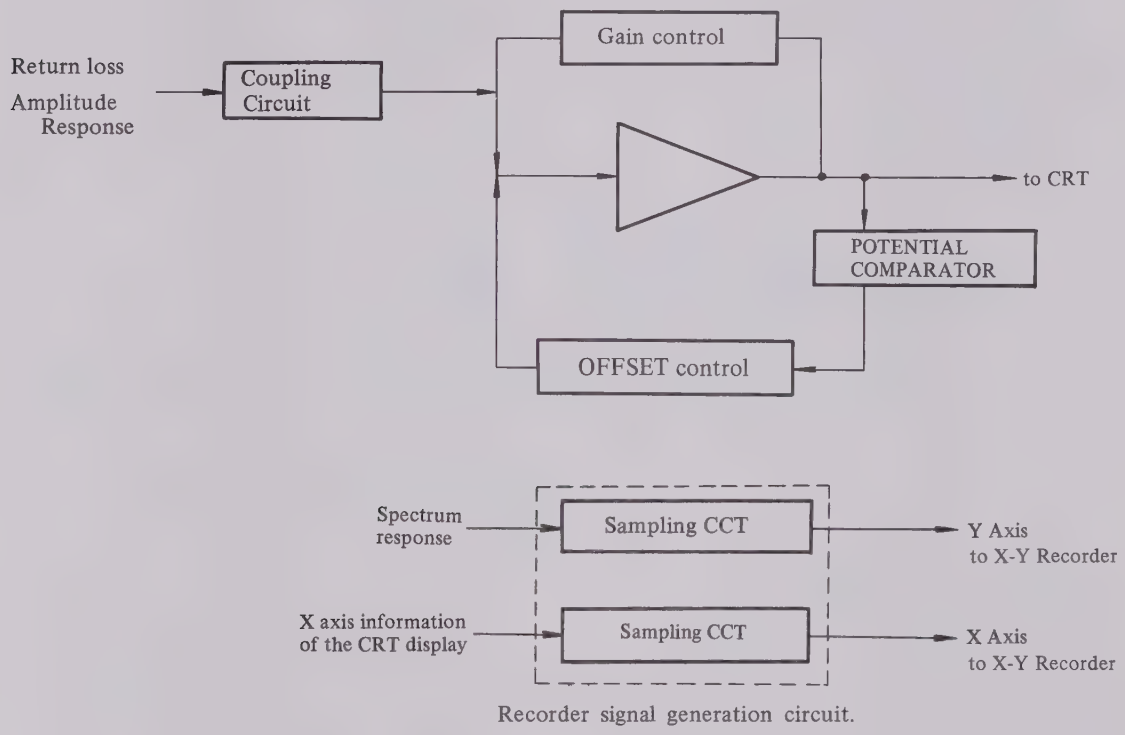


Fig. 50—Y OFFSET Board Block Diagram

D. Return Loss Troubleshooting

7.04 This paragraph describes the method of isolating the P.C board in which trouble has occured. Determine the defective board or part by the flow chart in Fig. 51.

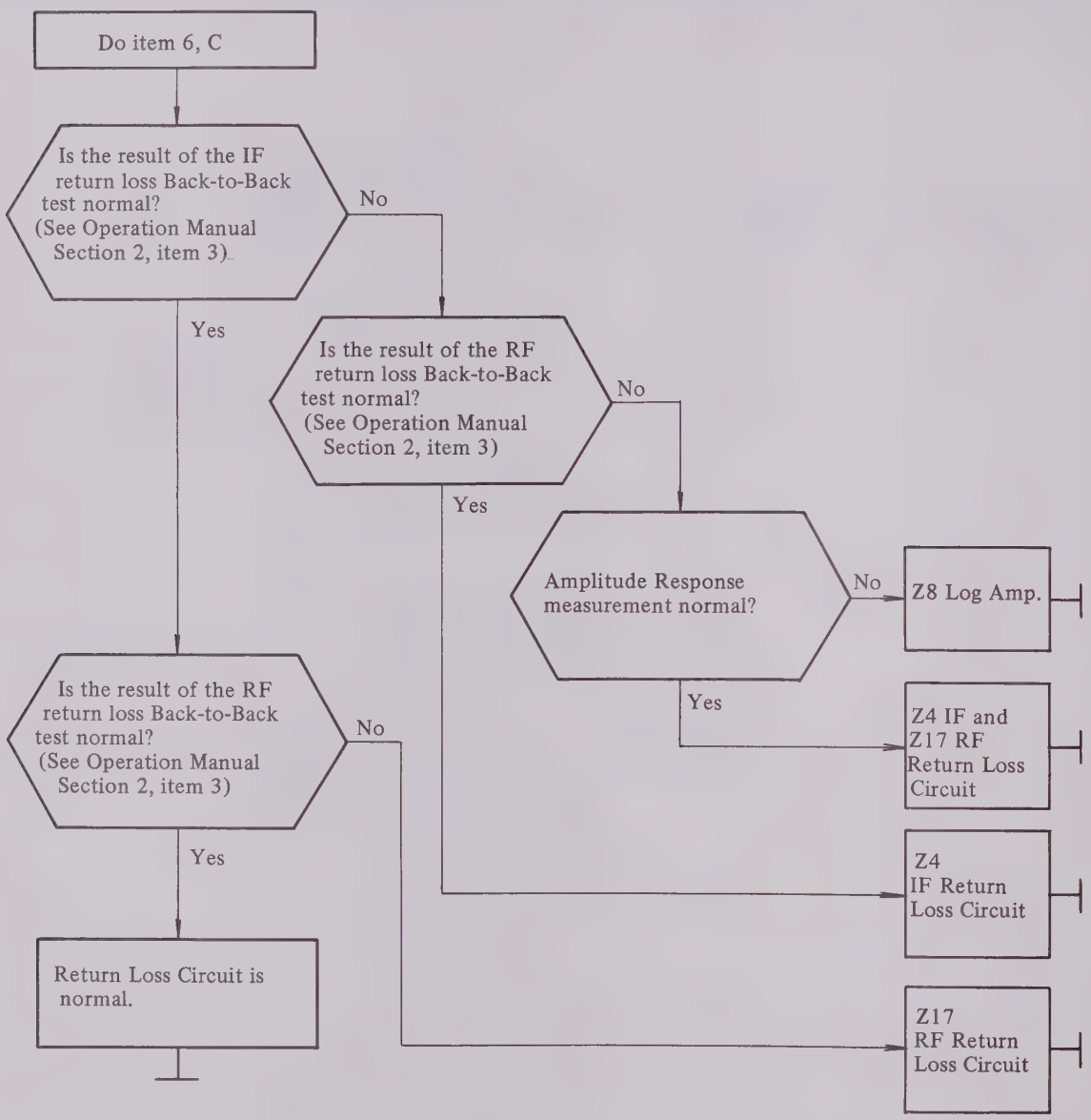

Do item 6, C
Is the result of the IF return loss Back-to-Back test normal? (See Operation Manual Section 2, item 3)
No
Yes
Is the result of the RF return loss Back-to-Back test normal? (See Operation Manual Section 2, item 3)
No
Yes
Amplitude Response measurement normal?
No
Z8 Log Amp.
Yes
Z4 IF and Z17 RF Return Loss Circuit
Is the result of the RF return loss Back-to-Back test normal? (See Operation Manual Section 2, item 3)
No
Yes
Z4 IF Return Loss Circuit
Return Loss Circuit is normal.
Z17 RF Return Loss Circuit

Fig. 51—Return Loss Troubleshooting Flow Chart

E. Spectrum Function Troubleshooting

7.05 This paragraph describes the method of isolating the P.C board in which trouble has occured. Determine the defective board or part by the flow chart in Fig. 53.

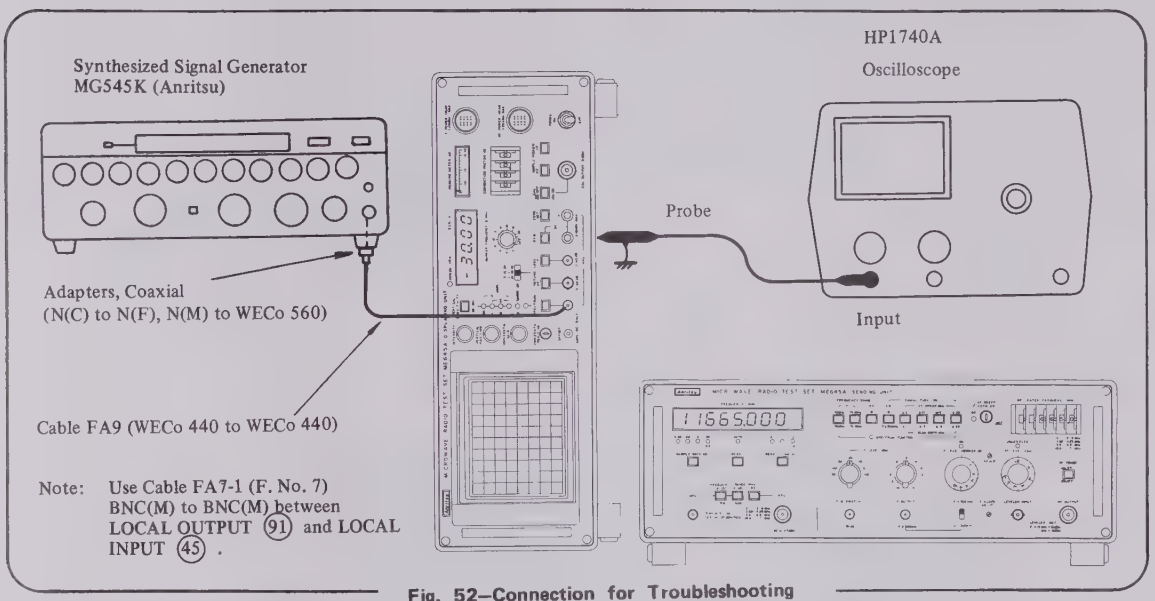

Synthesized Signal Generator
MG545K (Anritsu)
HP1740A
Oscilloscope
Probe
Input
Adapters, Coaxial
(N(C) to N(F), N(M) to WECo 560)
Cable FA9 (WECo 440 to WECo 440)
Note: Use Cable FA7-1 (F. No. 7) BNC(M) to BNC(M) between LOCAL OUTPUT (91) and LOCAL INPUT (45) .

Fig. 52—Connection for Troubleshooting

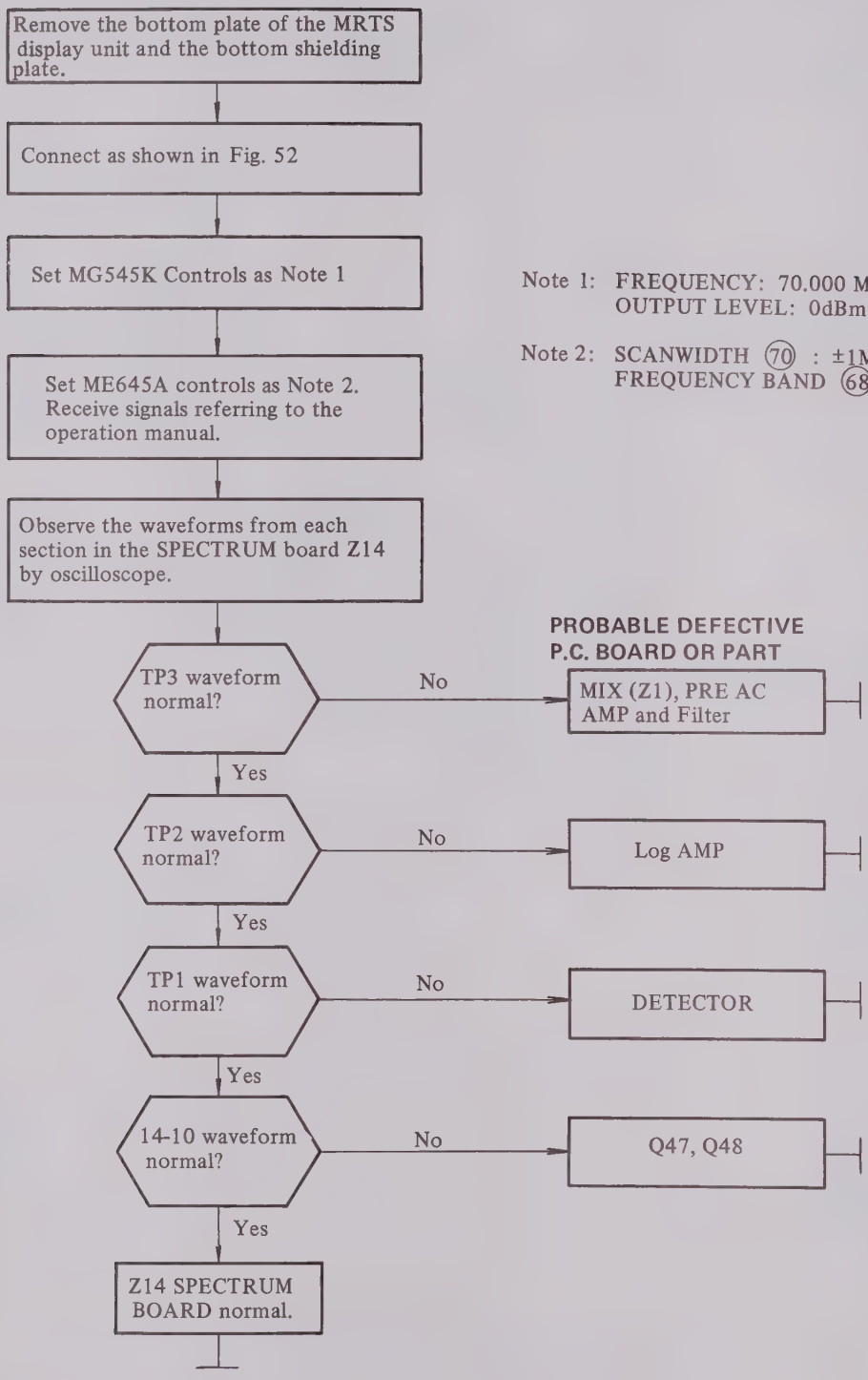

Remove the bottom plate of the MRTS display unit and the bottom shielding plate.
Connect as shown in Fig. 52
Set MG545K Controls as Note 1
Set ME645A controls as Note 2. Receive signals referring to the operation manual.
Observe the waveforms from each section in the SPECTRUM board Z14 by oscilloscope.
Note 1: FREQUENCY: 70.000 MHz
OUTPUT LEVEL: 0dBm
Note 2: SCANWIDTH (70) : ±1MHz
FREQUENCY BAND (68) : 70MHz
PROBABLE DEFECTIVE P.C. BOARD OR PART
TP3 waveform normal?
No
MIX (Z1), PRE AC AMP and Filter
Yes
TP2 waveform normal?
No
Log AMP
Yes
TP1 waveform normal?
No
DETECTOR
Yes
14-10 waveform normal?
No
Q47, Q48
Yes
Z14 SPECTRUM BOARD normal.

Fig. 53–Spectrum Funtion Troubleshooting Flow Chart

F. Y OFFSET Circuit Troubleshooting

7.06 This paragraph describes the method of isolating the P.C board in which trouble has occurred. Determine the defective board or part by the flow chart in Fig. 54.

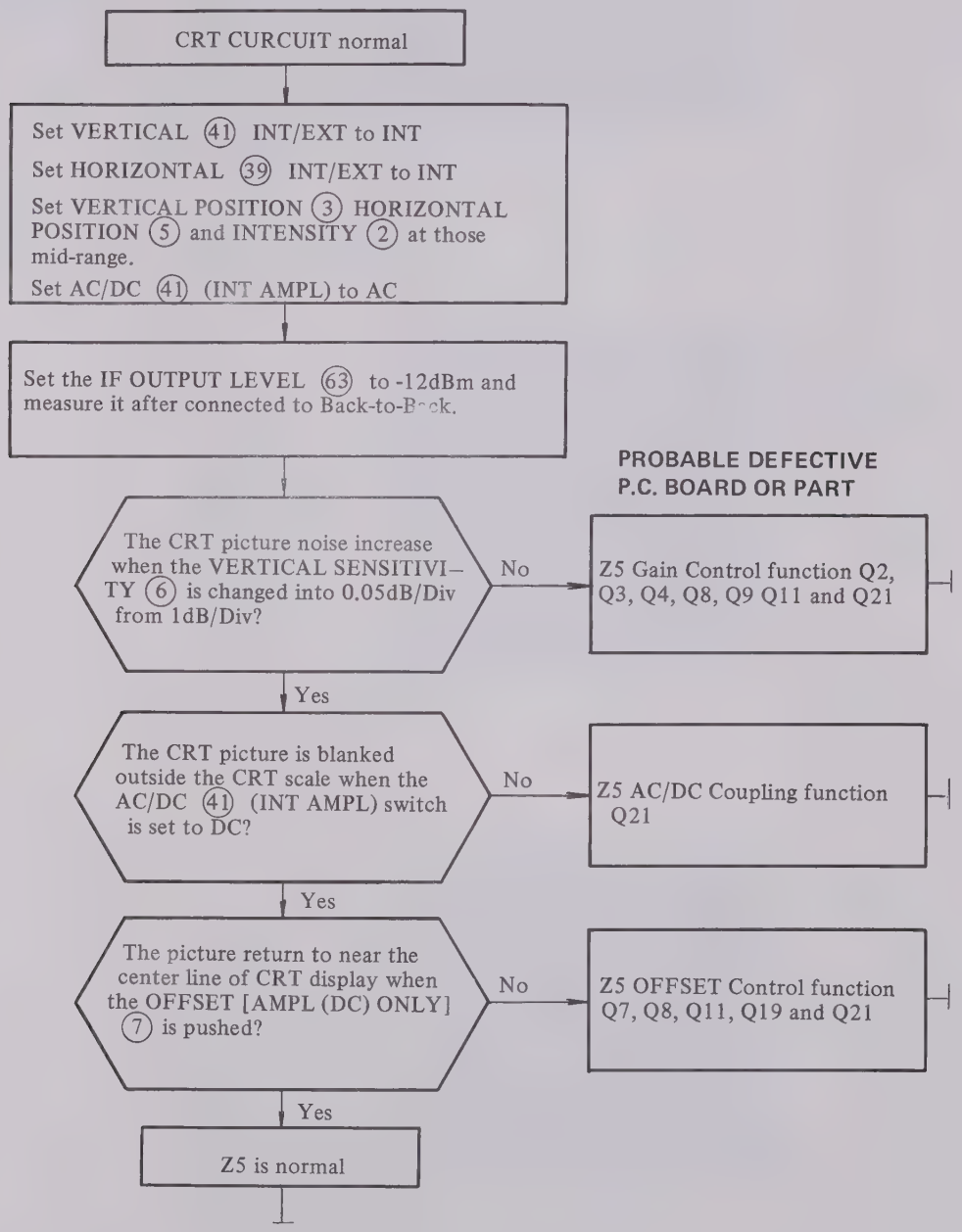
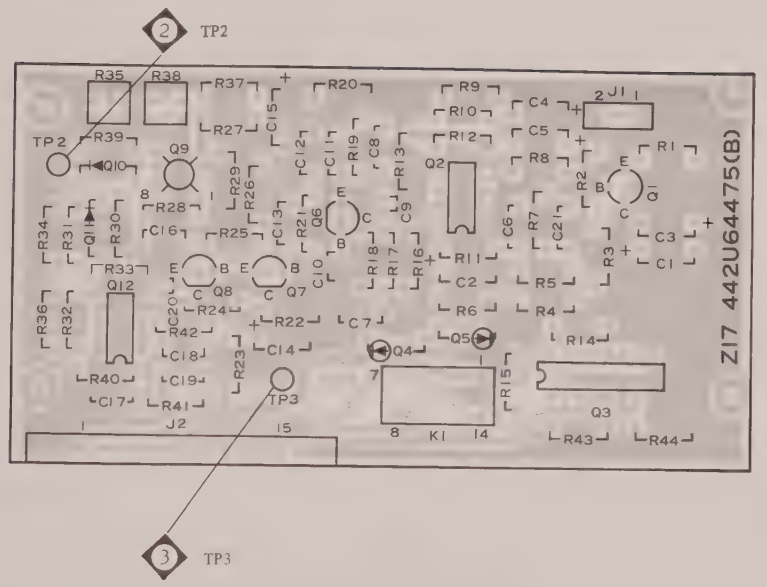
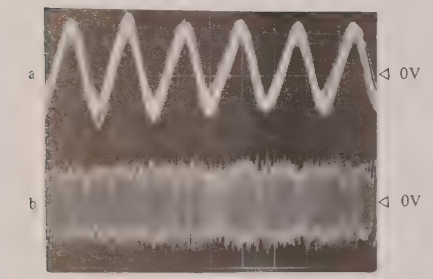

CRT CURCUIT normal
Set VERTICAL (41) INT/EXT to INT
Set HORIZONTAL (39) INT/EXT to INT
Set VERTICAL POSITION (3) HORIZONTAL POSITION (5) and INTENSITY (2) at those mid-range.
Set AC/DC (41) (INT AMPL) to AC
Set the IF OUTPUT LEVEL (63) to -12dBm and measure it after connected to Back-to-Back.
PROBABLE DEFECTIVE P.C. BOARD OR PART
The CRT picture noise increase when the VERTICAL SENSITIVITY (6) is changed into 0.05dB/Div from 1dB/Div?
No
Z5 Gain Control function Q2, Q3, Q4, Q8, Q9 Q11 and Q21
Yes
The CRT picture is blanked outside the CRT scale when the AC/DC (41) (INT AMPL) switch is set to DC?
No
Z5 AC/DC Coupling function Q21
Yes
The picture return to near the center line of CRT display when the OFFSET [AMPL (DC) ONLY] (7) is pushed?
No
Z5 OFFSET Control function Q7, Q8, Q11, Q19 and Q21
Yes
Z5 is normal

Fig. 54—Gain Control Troubleshooting Flow Chart

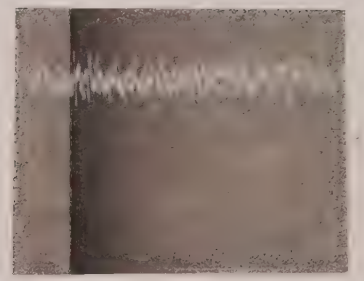


TP2 [RF PAD: 30dB]

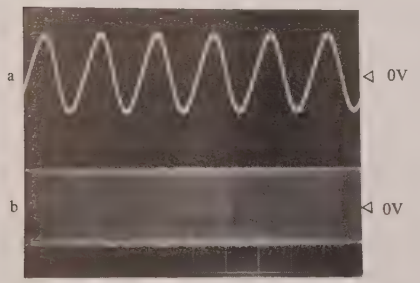


Ⓗ a: 20μsec/div
b: 1msec/div
Ⓥ : 20mV/div

TP3 [RF PAD: 30dB]



TP2 [RF PAD: 20dB]

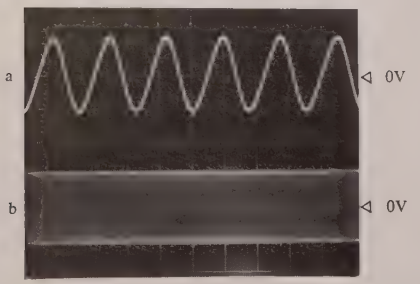


Ⓗ a: 20μsec/div
b: 1msec/div
Ⓥ : 200mV/div

TP3 [RF PAD: 20dB]

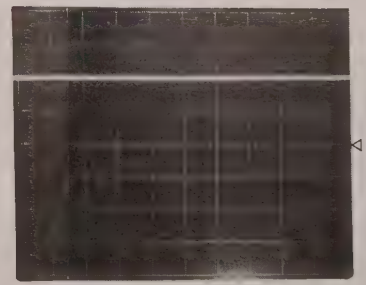
Ⓥ : 200mV/div
Ⓗ : 1msec/div

TP2 [RF PAD: 10dB]



Ⓗ a: 20μsec/div
b: 1msec/div
Ⓥ : 2V/div

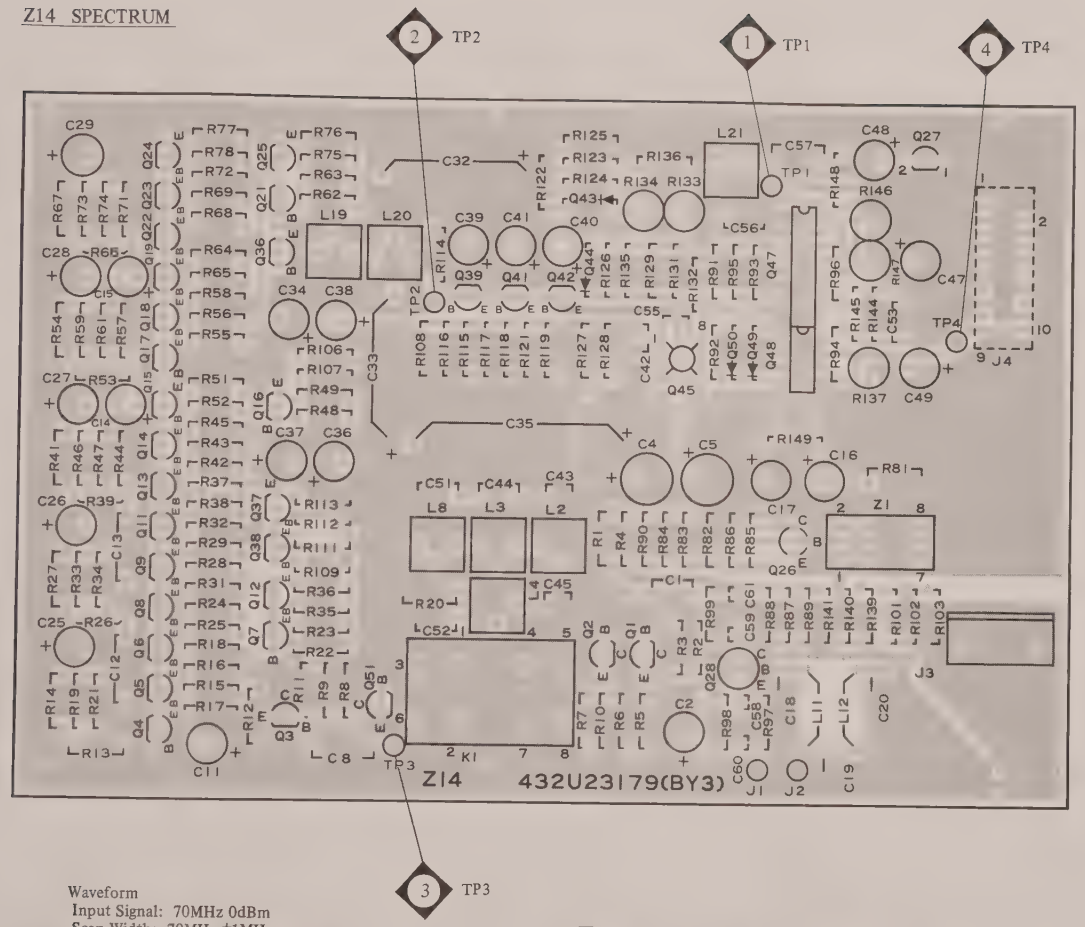
TP3 [RF PAD: 10dB]



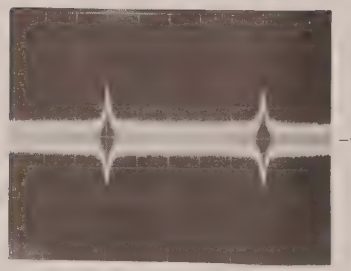
Ⓥ : 2V/div
Ⓗ : 1msec/div

Fig. 55—Spectrum, Return Loss Test Points

Z14 SPECTRUM

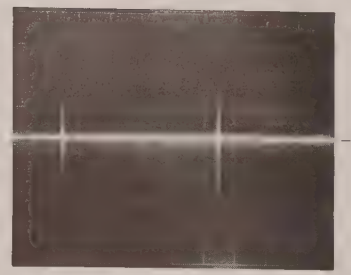


TP2



Ⓥ : 0.5V/div
Ⓗ : 20msec/div

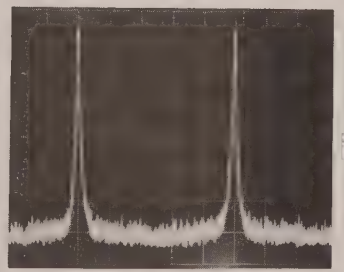
TP3



Ⓥ : 1V/div
Ⓗ : 20msec/div

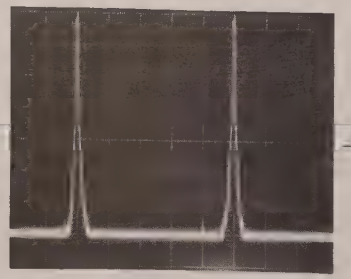
Waveform
Input Signal: 70MHz 0dBm
Scan Width: 70MHz ±1MHz

TP1



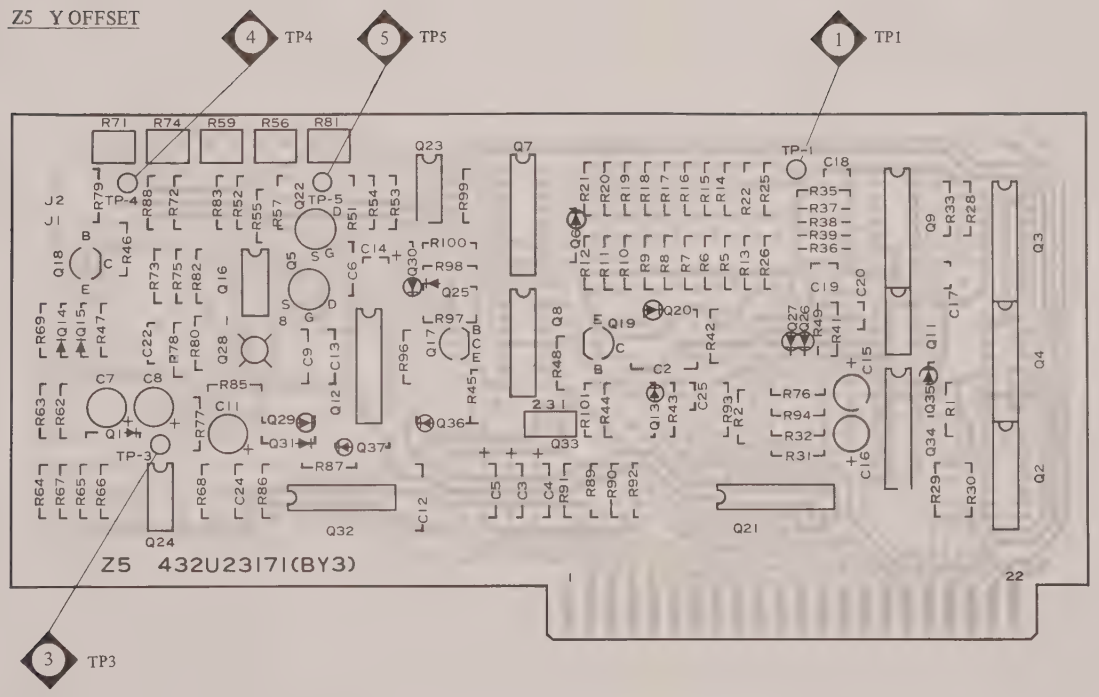
Ⓥ : 100mV/div
Ⓗ : 20msec/div

TP4

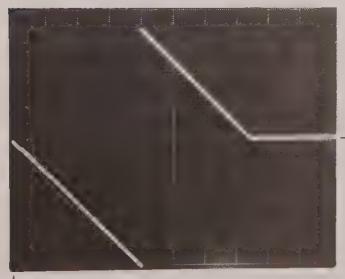


Ⓥ : 50mV/div
Ⓗ : 20msec/div

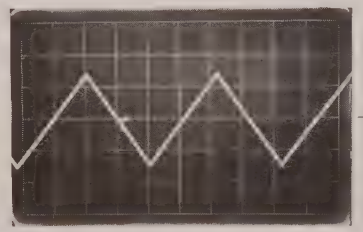
Fig. 56—Spectrum, Return Loss Test Points



TP1
IF POWER measurement mode (Input Level: 0dBm)
VERTICAL SENSITIVITY: 1dB/div
VERTICAL: DC (REAR PANEL)

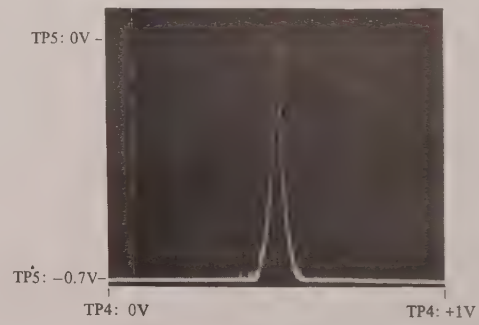


TP3
[DVM operation]



Note: When pushing the SPECTRUM ㉒, the waveform is sawtooth wave of 150 to 200 sec. period.

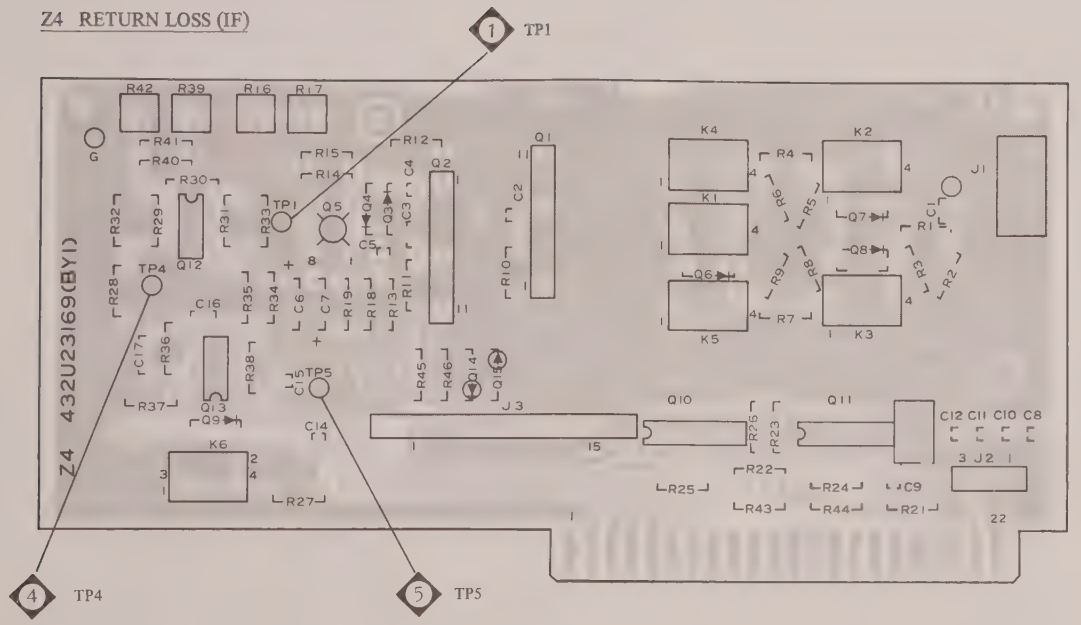
Relationship of waveform on the CRT of MRTS and TP4 voltage (X axis signal for X-Y Recorder), TP5 voltage (Y axis signal for X-Y Recorder)



Note: Voltage of TP4 and TP5 are measured at SPECTRUM measurement mode.

Fig. 57—Spectrum, Return Loss Test Points

Z4 RETURN LOSS (IF)

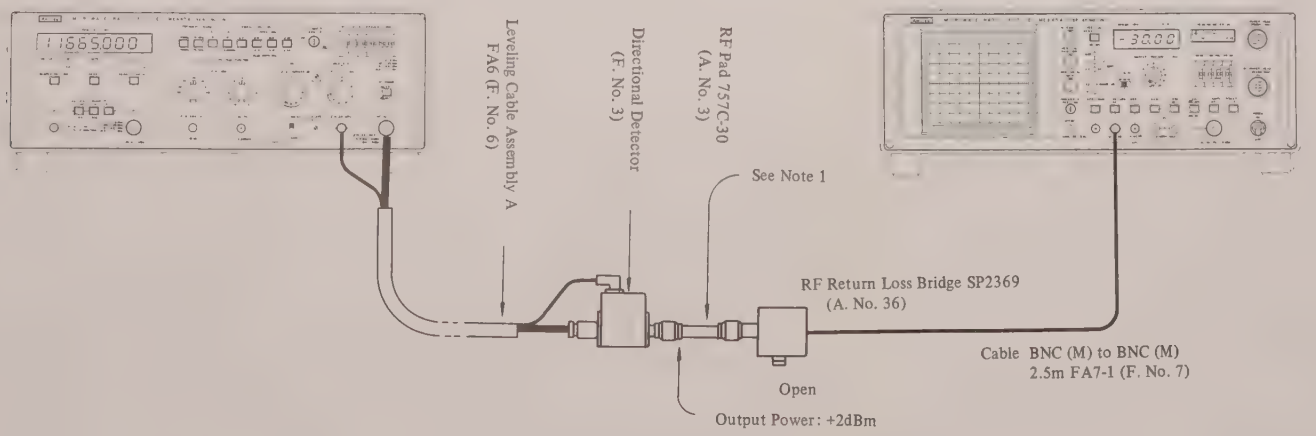


IF Return Loss
RANGE dB: 10 - 30dB

IF Input Level (dBm)	TP1 (DC: V)	TP4 (DC: V)	TP5 (DC: V)
-46	+0.05	+1.0	+1.0
-36	+0.45	+0.05	0
-26	+3.5	-0.84	-1.0

RF Return Loss
RANGE dB: 10 - 30dB

RF PAD NOTE 1	TP2 (SINE: V_{pp})	TP3 (DC: V)	TP4 (DC: V)	TP5 (DC: V)
30 dB	Refer to photograph	Refer to photograph	+1.0	+1.0
20 dB			0	0
10 dB			-1.0	-1.0



RF Return Loss Calibration Connections

Fig. 58–Spectrum, Return Loss Test Points

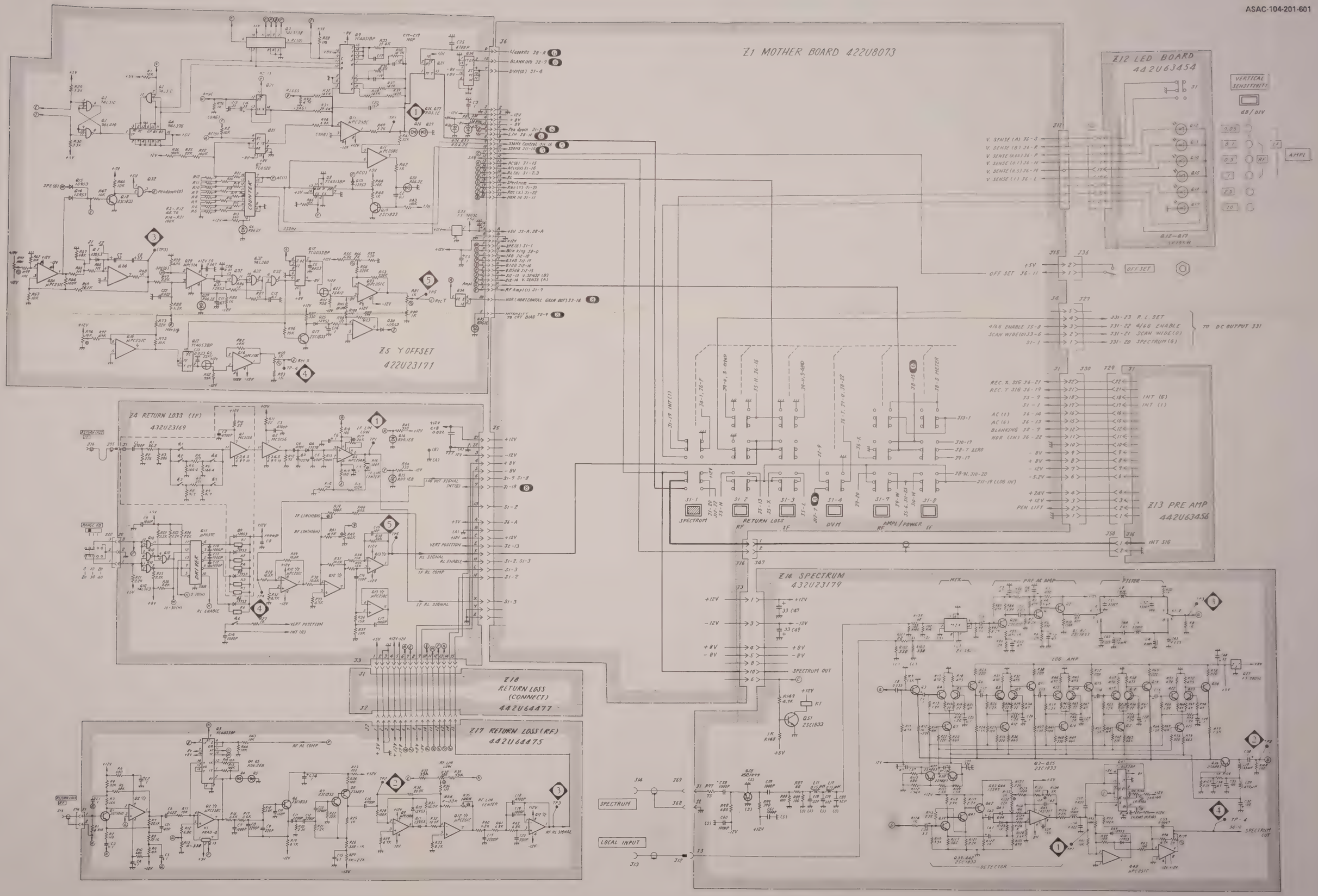


Fig. 59—SPECTRUM, RETURN LOSS (7)

7

SECTION 3

REPLACEABLE PARTS

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A. Circuit Reference and Abbreviation Used in Component List 3-1

B. Method of Reading Capacitance 3-2

C. Method of Reading Resistance 3-3

2. ORDERING INFORMATION 3-4

3. COMPONENT LIST OF DISPLAYING UNIT 3-5

4. COMPONENT LIST OF SENDING UNIT . . 3-19

1. INTRODUCTION

1.01 This section contains information relative to ordering replacement components. The following table shows circuit references (hereinafter CKT REF) and abbreviations used for components given in the component list.

In the component list, the quantity of each component is one so far as no quantitative description is given in the "NOTE" column.

A. Circuit Reference and Abbreviations Used in Component List

Circuit Reference

AT:	Attenuator	P:	Lamp
C:	Capacitor	Q:	Transistor, diode, rectifier, IC
F:	Fuse	R:	Resistor
J:	Jack, plug, connector	S:	Switch
K:	Relay	T:	Transformer
L:	Coil	V:	Neon lamp, vacuum tube
M:	Meter, timer	Z:	Unit

Abbreviations

A:	amperes	J-FET:	junction FET
Att:	Attenuator variable using film	k:	kilo (x 10^3)
R var:	resistive elements	LED:	light emitting diode
BL:	boundary layer	M:	mega (x 10^6)
Cer:	ceramic	m:	mili (x 10^{-3})
CF:	carbon film	MF:	metalized film
Comp:	composition	MOS-FET:	metal oxide semiconductor FET
CRT:	cathode-ray tube	M paper:	metalized paper
Di:	diode	M plast:	metalized plastic film
DIL type:	dual-in type	Multi:	multiplying
Elect:	electrolyte aluminium	Nch:	N channel
F:	farad	non-line:	non-linear taper
FET:	field effect transistor	Non-pol:	non-polarity
G:	ground	NPN:	negative-positive-negative
Ge:	germanium	Ω:	ohms
H:	henry	p:	pico (x 10^{-12})
Hz:	hertz	Plast:	plastic film
IC:	integrated circuit	PMTR:	potentiometer

Abbreviations (Cont)

PNP:	positive-negative-positive	Tr:	transistor
p-p, pp:	peak to peak value	Trans:	transformer
RFC:	RF choke	μ:	micro (x 10^{-6})
R-lamp:	Resistor lamp	V:	volt
rms:	effective value (root means square)	Var:	variable
SBD:	schottky barrier diode	WW:	wire wound
SCR:	silicon controlled rectifier	XTAL:	crystal
Si:	silicon		
SRD:	step recovery diode		
Tant:	tantalum		

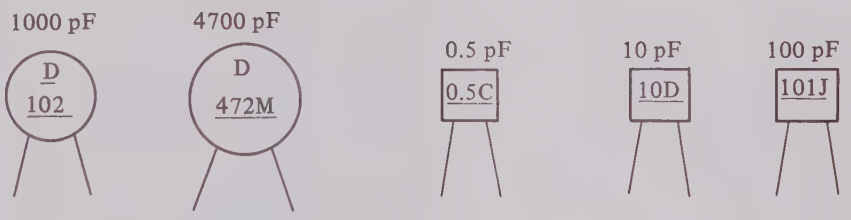
B. Method of Reading Capacitance

(a) Ceramic capacitor, polyester capacitor

Indication	0.5	1	10	101	102	103	104
Capacity	0.5pF	1pF	10pF	100pF	1000pF	0.01μF	0.1μF

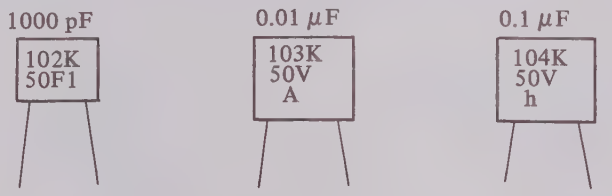
Example

Ceramic Capacitor



Capacity values are always underlined.

Polyester Capacitor



(b) Tantalum capacitor, Metallized capacitor and Electrolytic capacitor

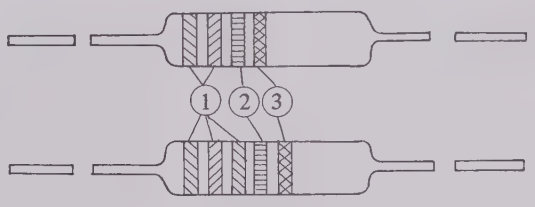
Indication	OR47	010	100	101
Capacity	0.47μF	1μF	10μF	100μF

C. Method of Reading Resistance

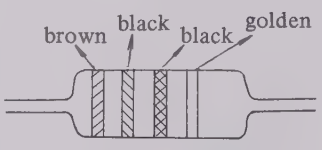
Indication of resistance are as follows:

Color	① Figure	② Multiplier	③ Tolerance
Black	0	10^0	
Brown	1	10^1	
Red	2	10^2	
Yellow red	3	10^3	
Yellow	4	10^4	
Green	5	10^5	±0.5%
Blue	6	10^6	
Purple	7	10^7	
Gray	8	10^8	
White	9	10^9	
Golden		10^{-1}	±5%

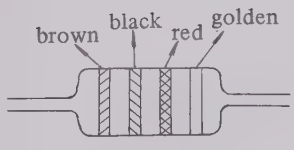
Indication example



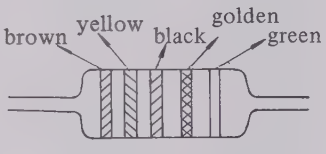
For Example;



100 ± 5%
10 Ω, ± 5%



102 ± 5 %
1 kΩ, ± 5 %



140 -1± 0.5 %
14.0Ω, ±0.5 %

2. ORDERING INFORMATION

2.01 Upon ordering P.C. boards and components, please give the following descriptions by referring to the component list.

Item	Example	
	P.C. board	Component
(1) Name of instrument	Microwave Radio Test Set ME645A	Microwave Radio Test Set ME645A
(2) Name of component list	Table 4-1 Sending Unit	Table 3-1 Displaying Unit
(3) CKT REF	Z3	C3
(4) Part name	432U21817	CE62B1E152XC *Note:* Part name is given in parentheses ( ) in the component list. Components with asterisks (*) are those that require factory adjustment upon repairing. When ordering a component with asterisk (*), give full description of the component.
(5) Quantity	1	1
(6) Serial No. of instrument	Serial No. M31257	Serial No. M31257

3. COMPONENT LIST OF DISPLAYING UNIT

Table 3–1 DISPLAYING UNIT

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Elect, 680μF, +75/–10%, 100V	CE62B2A681XC	
C2	Elect, 1000μF, +100/–10%, 63V	CE62B1J102XC	
C3	Elect, 1500μF, +100/–10%, 25V	CE62B1E152XC	
C4	Elect, 3300μF, +100/–10%, 63V	CE62B1J332XC	
C5	Elect, 470μF, +100/–10%, 40V	CE62B1G471XC	
C6	Paper, 0.5μF, +10/–10%, 1600V	CP711C3C504K	
F1	Fuse, 5A	MF61NN250V5AAC05	
F2	Fuse, 0.5A	MF61NN250V0.5AAC05	
F3	Fuse, 10A	MF51NN250V10AAC05	
F4	Fuse, 10A	MF51NN250V10AAC05	
J1	Receptacle	PA-125	
J2	Connector	U-SB1503	15P
J3	Connector	U-SA1003	10P
J4	Not assigned		
J5	Connector	U-SB1503	15P
J6	Connector	U-SB1503	15P
J7	Receptacle	R03R-6F	6P
J8	Receptacle	BNC-R-101 NI	
J9	Receptacle	BNC-R-101 NI	
J10	Receptacle	BNC-R-101 NI	
J11	Receptacle	BNC-R-101 NI	
J12	Plug	BNC-P620 or BNC-P2-NI	
J13	Panel jack	BNC-PJ608 or BNC-PJ2-NI	
J14	Connector	MODEL J12-2	
J15	Receptacle	BNC31-010	
J16	Connector	MODEL J12-2	
J17	Not assigned		
J18	Connector	U-SB1503	15P
J19	Connector	U-SB1503	15P
J20	Connector	PI011-03F	3P
J21	Not assigned		
J22	Not assigned		
J23	Connector	HIF3-34D-2.54R	34P
J24	Connector	HIF3-20D-2.54R	20P
J25	Connector	HIF3-34D-2.54R	34P
J26	Not assigned		
J27	Connector	PI011-05F	5P
J28	Connector	U-SB2203	22P
J29	Connector	U-SB2203	22P
J30	Connector	U-SB2203	22P
J31	Connector	57-40240	24P
J32	Connector	57-40140	14P
J33	Not assigned		
J34	Connector	PI011-02F	2P
J35	Connector	PI011-02F	2P
J36	Connector	PI011-02F	2P
J37	Not assigned		
J38	Not assigned		
J39	Not assigned		
J40	Connector	PI011-03F	3P
J41	Not assigned		
J42	Not assigned		
J43	Connector	PI011-05F	5P
J44	Not assigned		
J45	Not assigned		
J46	Connector	PI011-03F	3P
J47	Connector	PI011-02F	2P
J48	Connector	PI011-02F	2P
J49	Connector	PI011-02F	2P
J50	Connector	PI011-02F	2P
J51	Connector	PI011-05F	5P
J52	Connector	PI011-05F	5P
J53	Connector	PI011-05F	5P
J54	Connector	PI011-05F	5P
J55	Connector	PI011-05F	5P
J56	Connector	PI011-05F	5P
J57	Connector	PI011-05F	5P
J58	Connector	PI011-03F	3P
J59	Connector	PI011-03F	3P
J60	Connector	PI011-03F	3P
J61	Connector	CRT Socket	
J62	Connector	PI011-02F	2P
J63	Connector	PI011-02F	2P
J64	Terminal (J)	60983-1	
J65	Terminal (J)	60983-1	
J66	Not assigned		
J67	Not assigned		
J68	Terminal (J)	60983-1	
J69	Terminal (J)	60983-1	
J70	Terminal (J)	60983-1	
J71	Terminal (J)	60983-1	
J72	Terminal (J)	60983-1	
J73	Terminal (J)	60983-1	
J74	Connector	PI011-02F	2P
J75	Plug	BNC-P620 or BNC-P2-NI	
J76	Terminal	HT-0202	
J77	Terminal	HT-0201	
J78	Connector	PI011-02F	
M1	Meter	44M62537	
Q1	Not assigned		
Q2	Not assigned		
Q3	Not assigned		
Q4	Not assigned		
Q5	Not assigned		
Q6	Not assigned		
Q7	Not assigned		
Q8	Not assigned		
Q9	Tr, Si, NPN	2SC2199	
Q10	Tr, Si, NPN	2SC2199	
Q11	Tr, Si, NPN	2SC2199	
Q12	Tr, Si, NPN	2SC2199	
Q13	Tr, Si, NPN	2SC2199	
Q14	Surge absorb	ERZ-C14DK 471	
Q15	Surge absorb	ERZ-C14DK 471	
R1	Var, MF, 500kΩ	RG161N15SB500kΩ	
R2	Var, MF, 2kΩ	RG161N15SB2kΩ	
R3	MF, 1MΩ, ±1%, 1W	RN05C3A1004F	
R4	MF, 1MΩ, ±1%, 1W	RN05C3A1004F	
R5	MF, 1.2MΩ, ±5%, 2W	RH2HVS1.2MΩJ	
R6	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
S1	Toggle	ET115D12	
S2	Digital switch	44S62197	
S3	Pushbutton	MSP-103C	
S4	Slide switch	SL83-7H	
T1	Trans	44T63711	
T2	Trans	44T63712	
V1	CRT	140ARB7	
Z1	MOTHER BOARD	422U8073	Table 3–2
Z2	POWER SOURCE	422U8075	Table 3–3
Z3	CRT BIAS	432U23167	Table 3–4
Z4	RETURN LOSS (IF)	432U23169	Table 3 5
Z5	Y OFFSET	432U23171	Table 3–6
Z6	CPU BOARD	432U23173	Table 3–7
Z7	A/D INTERFACE	432U23175	Table 3–8
Z8	AMPLIFIER	432U23177	Table 3 9
Z9	CONNECTOR BOARD	442U63448	Table 3–10
Z10	REFERENCE OSC	442U63450	Table 3–11
Z11	MARKER BOARD	442U63452	Table 3–12
Z12	LED BOARD	442U63454	Table 3–13
Z13	PRE AMP	442U63456	Table 3 14
Z14	SPECTRUM	432U23179	Table 3–15
Z15	IF LINEARIZER	432U23181	Tabl3 3 16
Z16	RF LINEARIZER	432U23181	Table 3–17
Z17	RETURN LOSS (RF)	442U64475	Table 3–18
Z18	RETURN LOSS (CONNECT)	442U64477	Table 3–19

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 3–2 Z1 MOTHER BOARD			
J1	Connector	U-PB2221	22P
J2	Connector	U-PB1521	15P
J3	Connector	U-PA1021	10P
J4	Connector	PI011-05M	5P
J5	Connector	225J-22221-587	44P
J6	Connector	225J-22221-587	44P
J7	Connector	225J-22221-587	44P
J8	Connector	225J-22221-587	44P
J9	Connector	225J-22221-587	44P
J10	Connector	225J-22221-587	44P
J11	Connector	HIF2-34D-2.54R	34P
J12	Connector	HIF2-34D-2.54R	34P
J13	Connector	PI011-02M	2P
J14	Connector	PI011-02M	2P
J15	Connector	PI011-02M	2P
J16	Connector	PI021-02M	2P
J17	Connector	PI021-02M	2P
J18	Connector	PI021-02M	2P
S1	Pushbutton	44S62548	
Table 3–3 Z2 POWER SUPPLY			
C1	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C2	Elect, 10μF, ±20%, 63V	KX63VB-10	
C3	Elect, 180μF, 63V	FZT2H1J181	
C4	Elect, 180μF, 63V	FZT2H1J181	
C5	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C6	Elect, 33μF, ±20%, 16V	KX16VB-33	
C7	Elect, 470μF, 25V	FZT2H1E471	
C8	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C9	Elect, 10μF, ±20%, 63V	KX63VB-10	
C10	Elect, 470μF, 25V	FZT2H1E471	
C11	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C12	Not assigned		
C13	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C14	Elect, 10μF, ±20%, 63V	KX63VB-10	
C15	Elect, 470μF, 25V	FZT2H1E471	
C16	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C17	Elect, 47μF, ±20%, 10V	KX10VB-47	
C18	Not assigned		
C19	Elect, 33μF, ±20%, 16V	KX16VB-33	
C20	Elect, 33μF, ±20%, 16V	KX16VB-33	
C21	Elect, 33μF, ±20%, 16V	KX16VB-33	
C22	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C23	Elect, 47μF, ±20%, 35V	KX35VB-47	
C24	Not assigned		
C25	Elect, 47μF, ±20%, 35V	KX35VB-47	
C26	Elect, 47μF, ±20%, 35V	KX35VB-47	
C27	Elect, 33μF, ±20%, 16V	KX16VB-33	
C28	Elect, 33μF, ±20%, 16V	KX16VB-33	
C29	Elect, 33μF, ±20%, 16V	KX16VB-33	
C30	Elect, 33μF, ±20%, 16V	KX16VB-33	
C31	Elect, 33μF, ±20%, 16V	KX16VB-33	
C32	Not assigned		
C33	Elect, 47μF, ±20%, 10V	KX10VB-47	
C34	Elect, 47μF, ±20%, 10V	KX10VB-47	
F1	Fuse, 1.6A	MF51NN250V1.6ADC01	
F2	Fuse, 1.6A	MF51NN250V1.6ADC01	
F3	Fuse, 1.6A	MF51NN250V1.6ADC01	
F4	Fuse, 2A	MF51NN250V2ADC01	
J1	Connector	U-PB1521	15P
J2	Connector	U-PB1021	10P
J3	Connector	U-PB1521	15P
J4	Connector	PI011-05M	5P
J5	Connector	PI011-05M	5P
J6	Connector	PI011-05M	5P
J7	Connector	PI011-05M	5P
J8	Connector	PI011-05M	5P
J9	Connector	PI011-05M	5P
L1	Coil, 1mH, 3A	SR102-3AM	
L2	Coil, 125μH, 2A	SF-T8-50D	
L3	Coil, 125μH, 2A	SF-T8-50D	
L4	Coil, 1mH, 3A	SR102-3AM	
L5	Coil, 110μH, 3A	SF-T10-50	

CKT REF	DESCRIPTION	PART NAME	NOTE
L6	Coil, 1mH, 3A	SR102-3AM	
L7	Coil, 110μH, 3A	SF-T10-50	
L8	Coil, 1mH, 3A	SR102-3AM	
L9	Coil, 110μH, 3A	3F-T10-50	
L10	Not assigned		
L11	Coil, 125μH, 2A	SF-T8-50D	
L12	Not assigned		
L13	Coil, 125μH, 2A	SF-T10-50D	
L14	Coil, 125μH, 2A	SF-T10-50D	
L15	Coil, 125μH, 2A	SF-T8-50D	
M1	Timer	TM-0	
Q1	Rectifier	V03C	
Q2	Rectifier	V03C	
Q3	Rectifier	V03C	
Q4	Rectifier	V03C	
Q5	Rectifier	U05C	
Q6	Rectifier	U05C	
Q7	Rectifier	U05C	
Q8	Rectifier	U05C	
Q9	Rectifier	V03C	
Q10	Rectifier	V03C	
Q11	Rectifier	V03C	
Q12	Rectifier	V03C	
Q13	Rectifier	U05C	
Q14	Rectifier	U05C	
Q15	Rectifier	U05C	
Q16	Rectifier	U05C	
Q17	Rectifier	V03C	
Q18	Rectifier	V03C	
Q19	Rectifier	V03C	
Q20	Rectifier	V03C	
Q21	Not assigned		
Q22	Tr, Si, PNP	2SA510	
Q23	Tr, Si, NPN	2SC1833	
Q24	Tr, Si, NPN	2SC1833	
Q25	Not assigned		
Q26	Di, breakdown, 7.7 to 8.7V, 400mW	1S2192	
Q27	Di, breakdown, 22.8 to 27.6V, 400mW	RD24E	
Q28	Di, breakdown, 12.4 to 15.0V, 400mW	RD13E	
Q29	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q30	Di, Si	1S1834	
Q31	Di, Si	1S1834	
Q32	IC	μPC141A	
Q33	IC	μPC141A	
Q34	Di, breakdown, 4.8 to 5.7V, 400mV	RD5.1E	
Q35	Tr, Si, PNP	2SA883	
Q36	IC	FS7812 (S)	
Q37	IC	FS7808 (S)	
Q38	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q39	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q40	Di, Si	1S1834	
Q41	Di, Si	1S1834	
Q42	Di, Si	1S1834	
Q43	Not assigned		
Q44	Tr, Si, PNP	2SA708	
Q45	Tr, Si, NPN	2SC1833	
Q46	Tr, Si, NPN	2SC1833	
Q47	IC	FS7805 (S)	
Q48	IC	FS7805 (S)	
Q49	Di, breakdown, 22.8 to 27.6V, 400mW	RD24E	
Q50	Di, breakdown, 12.4 to 15.0V, 400mW	RD13E	
Q51	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q52	Di, Si	1S1834	
Q53	Di, Si	1S1834	
Q54	Di, Si	1S1834	
Q55	IC	μPC141A	
Q56	IC	FS7808 (S)	
Q57	IC	FS7908 (S)	
Q58	Not assigned		
Q59	Not assigned		
Q60	IC	FS7812 (S)	
Q61	IC	FS-7908 C	
Q62	IC	FS7808 (S)	
Q63	IC	FS7908 (S)	
Q64	Tr, Si, PNP	2SA708	
Q65	Tr, Si, NPN	2SC1833	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-3. Z2 POWER SUPPLY (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q66	Tr, Si, NPN	2SC1833	
Q67	Not assigned		
Q68	Not assigned		
Q69	Di, breakdown, 22.8 to 27.6V, 400mW	RD24E	
Q70	Di, breakdown, 12.4 to 15.0V, 400mW	RD13E	
Q71	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q72	Di, Si	1S1834	
Q73	Di, Si	1S1834	
Q74	Di, Si	1S1834	
Q75	IC	μPC141A	
Q76	IC	μPC151A	
Q77	Di, breakdown, 3.5 to 4.8V, 400mW	RD3.9E	
Q78	Di, breakdown, 7.0 to 7.9V, 400mW	RD7.5E B	
R1	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R2	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R3	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R4	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R5	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R6	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R7	Not assigned		
R8	Not assigned		
R9	Not assigned		
R10	Not assigned		
R11	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R12	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R13	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R14	Var, MF, 1kΩ	RJ-6P 1kΩ	
R15	Not assigned		
R16	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R17	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R18	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R19	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R20	Not assigned		
R21	Not assigned		
R22	Not assigned		
R23	Not assigned		
R24	Not assigned		
R25	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R26	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R27	Var, MF, 1kΩ	RJ-6P 1kΩ	
R28	Not assigned		
R29	Not assigned		
R30	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R31	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R32	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R33	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R34	Var, MF, 1kΩ	RJ-6P 1kΩ	
R35	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R36	Not assigned		
R37	Not assigned		
R38	Not assigned		
R39	Not assigned		
R40	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R41	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R42	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R43	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R44	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R45	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R46	Not assigned		
R47	Not assigned		
R48	Not assigned		
R49	Not assigned		
R50	Not assigned		
R51	Var, MF, 1kΩ	RJ-6P 1kΩ	
R52	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R53	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R54	Not assigned		
R55	MF, 806Ω, ±0.5%, 1/4W	RN14K2E8060D	
R56	MF, 243Ω, ±0.5%, 1/4W	RN14K2E2430D	
R57	Var, MF, 100Ω	RJ-6P 100Ω	
R58	MF, 806Ω, ±0.5%, 1/4W	RN14K2E8060D	
R59	MF, 301Ω, ±0.5%, 1/4W	RN14K2E3010D	
R60	Var, MF, 100Ω	RJ-6P 100Ω	
R61	Var, MF, 100Ω	RJ-6P 100Ω	
R62	Var, MF, 100Ω	RJ-6P 100Ω	
R63	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R64	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R65	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R66	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R67	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R68	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R69	MF, 243Ω, ±0.5%, 1/4W	RN14K2E2430D	
R70	MF, 806Ω, ±0.5%, 1/4W	RN14K2E8060D	
R71	MF, 806Ω, ±0.5%, 1/4W	RN14K2E8060D	
R72	MF, 301Ω, ±0.5%, 1/4W	RN14K2E3010D	
R73	Not assigned		
R74	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R75	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R76	Var, MF, 1kΩ	RJ-6P 1kΩ	
R77	Not assigned		
R78	Not assigned		
R79	Not assigned		
R80	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R81	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R82	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	

Table 3-4 Z3 CRT BIAS

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C2	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C3	Not assigned		
C4	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C5	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C6	Plast, 0.1μF, ±20%, 250V	MD22E104M	
C7	Not assigned		
C8	Not assigned		
C9	Not assigned		
C10	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C11	Cer, 0.01μF, +100/-0%, 3kV	MLD28J10000pF +100/-0% DC3kV	
C12	Cer, 0.01μF, +100/-0%, 3kV	MLD28J10000pF +100/-0% DC3kV	
C13	Cer, 0.01μF, +100/-0%, 3kV	MLD28J10000pF +100/-0% DC3kV	
C14	Elect, 3.3μF, +100/-10%, 160V	CE02B2C3R3X	
C15	Elect, 3.3μF, +100/-10%, 160V	CE02B2C3R3X	
C16	Elect, 22μF, ±20%, 63V	KX63VB-22	
C17	Elect, 22μF, ±20%, 63V	KX63VB-22	
C18	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C19	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C20	Not assigned		
C21	Elect, 3.3μF, +100/-10%, 160V	CE02B2C3R3X	
C22	Elect, 3.3μF, +100/-10%, 160V	CE02B2C3R3X	
C23	Elect, 3.3μF, +100/-10%, 160V	CE02B2C3R3X	
C24	Elect, 3.3μF, ±20%, 100V	KX100VB-3.3	
C25	Elect, 3.3μF, ±20%, 100V	KX100VB-3.3	
C26	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C27	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C28	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C29	Cer, 15pF, ±5%, 500V	CC45CH2H150JX	
J1	Connector	U-PB1521	15P
J2	Connector	PI011-05M	5P
J3	Connector	PI011-05M	5P
J4	Connector	PI011-03M	3P
J5	Connector	PI011-03M	3P
J6	Connector	PI011-03M	3P
J7	Connector	PI011-02M	2P
J8	Connector	PI011-02M	2P
J9	Terminal (P)	60S99-3	
J10	Terminal (P)	60S99-3	
L1	Coil, 180mH	339T14801	
L2	Microinductor, 470μH	LH1-471K	
L3	Microinductor, 470μH	LH1-471K	
L4	Microinductor, 22mH	LH1-223K	
L5	Microinductor, 22mH	LH1-223K	
Q1	Tr, Si, NPN	2SC1833	
Q2	Tr, Si, PNP	2SA883	
Q3	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q4	Tr, Si, NPN	2SC1833	
Q5	Tr, Si, NPN	2SC1833	
Q6	Tr, Si, NPN	2SC1833	
Q7	Tr, Si, NPN	2SC1278Ⓢ	
Q8	Tr, Si, NPN	2SC1278Ⓢ	
Q9	Tr, Si, NPN	2SC1278Ⓢ	
Q10	Tr, Si, NPN	2SC1278Ⓢ	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-4. Z3 CRT BIAS (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q11	Di, Si	1S1834	
Q12	Di, Si	1S1834	
Q13	Tr, Si, PNP	2SA883	
Q14	Tr, Si, NPN	2SC1833	
Q15	Tr, Si, NPN	2SC1833	
Q16	Tr, Si, NPN	2SC1833	
Q17	Tr, Si, NPN	2SC1279Ⓢ	
Q18	Tr, Si, NPN	2SC1279Ⓢ	
Q19	Tr, Si, NPN	2SC1279Ⓢ	
Q20	Tr, Si, NPN	2SC1279Ⓢ	
Q21	Not assigned		
Q22	Photocoupler	PS2001	
Q23	Tr, Si, NPN	2SC1278Ⓢ	
Q24	Di, Si	1S1834	
Q25	Di, Si	S5234	
Q26	Tr, Si, NPN	2SD297	
Q27	Tr, Si, NPN	2SD297	
Q28	Di, Si	1S953	
Q29	Di, Si	1S953	
Q30	Not assigned		
Q31	Di, Si	1S1834	
Q32	Di, Si	1S1834	
Q33	Di, Si	1S1834	
R1	CF, 0Ω to 1kΩ, ±5%, 1/4W	ARD25T*J	*
R2	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R3	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R4	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R5	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R6	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R7	Not assigned		
R8	Not assigned		
R9	Not assigned		
R10	Not assigned		
R11	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R12	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R13	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R14	CF, 1k to 10kΩ, ±5%, 1/4W	ARD25T *J	*
R15	Var, MF, 5kΩ	RJ-6P 5kΩ	
R16	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R17	Not assigned		
R18	CF, 1k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R19	CF, 1k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R20	Not assigned		
R21	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R22	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R23	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R24	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R25	CF, 27kΩ, ±5%, 1/4W	ARD25T273J	
R26	CF, 27kΩ, ±5%, 1/4W	ARD25T273J	
R27	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R28	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R29	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R30	Not assigned		
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R33	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R34	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R35	CF, 120kΩ, ±5%, 1/4W	ARD25T124J	
R36	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R37	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R38	Not assigned		
R39	Not assigned		
R40	Not assigned		
R41	Not assigned		
R42	Not assigned		
R43	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R44	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R45	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R46	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R47	CF, 2.7kΩ, ±5%, 1/4W	ARD25T272J	
R48	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R49	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R50	Not assigned		
R51	CF, 330Ω to 1kΩ, ±5%, 1/4W	ARD25T*J	*
R52	CF, 330Ω to 1kΩ, ±5%, 1/4W	ARD25T*J	*
R53	CF, 1k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R54	Not assigned		
R55	Not assigned		

CKT REF	DESCRIPTION	PART NAME	NOTE
R56	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R57	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R58	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R59	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R60	Not assigned		
R61	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R62	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R63	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R64	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R65	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R66	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R67	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R68	Not assigned		
R69	Not assigned		
R70	Not assigned		
R71	Var, MF, 100kΩ	RJ-6P 100kΩ	
R72	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R73	CF, 10 to 470Ω, ±5%, 1/4W	ARD25T*J	*
R74	CF, 10K to 1MΩ, ±5%, 1/4W	ARD25T*J	*
R75	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R76	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R77	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R78	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R79	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R80	Not assigned		
R81	CF, 4.7Ω, ±5%, 1/4W	ARD25T4R7J	
R82	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R83	CF, 270kΩ, ±5%, 1/4W	ARD25T274J	
R84	CF, 270kΩ, ±5%, 1/4W	ARD25T274J	
R85	MF, 1.2MΩ, ±5%, 1W	RH1HVS1.2MΩJ	
R86	Var, MF, 500kΩ	RJ-6P 500kΩ	
R87	Var, MF, 500kΩ	RJ-6P 500kΩ	
R88	CF, 68Ω, ±5%, 1/4W	ARD25T 680J	
R89	CF, 68Ω, ±5%, 1/4W	ARD25T 680J	
R90	MF, 10MΩ, ±5%, 1W	RH1HVS10MΩJ	Q'ty 0 or 1*
R91	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R92	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R93	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R94	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
T1	Trans	339T13818B	
Z1	Rectification block	MR4A-7F or MSL-4528	

Table 3–5 Z4 RETURN LOSS (IF)

C1	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C2	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C3	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C4	Cer, 470pF, ±5%, 50V	RPE111CH471JY50	
C5	Cer, 470pF, ±5%, 50V	RPE111CH471JY50	
C6	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C7	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C8	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C9	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C10	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C11	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C12	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C13	Not assigned		
C14	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C15	Cer, 10pF, ±0.5pF, 50V	CC92CH1H100DY	
C16	Cer, 150pF, ±5%, 50V	RD312CH151JY50	
C17	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
J1	Connector	BNC-R601	
J2	Connector	PI011-03M	3P
J3	Connector	U-PB1521	15P

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-5. Z4 RETURN LOSS (IF) (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
K1	Reed relay	REA3	
K2	Reed relay	REA3	
K3	Reed relay	REA3	
K4	Reed relay	REA3	
K5	Reed relay	REA3	
K6	Reed relay	REA3	
Q1	IC	MC5156	
Q2	IC	MC5156	
Q3	Di, Si	1SS78	
Q4	Di, Si	1SS78	
Q5	IC	μPC254A	
Q6	Di, Si	1S953	
Q7	Di, Si	1S953	
Q8	Di, Si	1S953	
Q9	Di, Si	1S953	
Q10	IC	74LS03	
Q11	IC	μPA57C	
Q12	IC	μPC251C	
Q13	IC	μPC258C	
Q14	Di, breakdown, 8.5 to 9.6V, 400mW	RD9.1EB	
Q15	Di, breakdown, 8.5 to 9.6V, 400mW	RD9.1EB	
R1	MF, 56.2Ω, ±0.5%, 1/4W	NRN1/4C4 56.2ΩD	
R2	MF, 226Ω, ±0.5%, 1/4W	NRN1/4C4 226ΩD	
R3	MF, 226Ω, ±0.5%, 1/4W	NRN1/4C4 226ΩD	
R4	MF, 107Ω, ±0.5%, 1/4W	NRN1/4C4 107ΩD	
R5	MF, 144.4Ω, ±0.5%, 1/4W	NRN1/4C4 144.4ΩD	
R6	MF, 144.4Ω, ±0.5%, 1/4W	NRN1/4C4 144.4ΩD	
R7	MF, 371Ω, ±0.5%, 1/4W	NRN1/4C4 371ΩD	
R8	MF, 91.7Ω, ±0.5%, 1/4W	NRN1/4C4 91.7ΩD	
R9	MF, 91.7Ω, ±0.5%, 1/4W	NRN1/4C4 91.7ΩD	
R10	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R11	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R12	MF, 75.0Ω, ±0.5%, 1/4W	NRN1/4C4 75.0ΩD	
R13	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R14	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R15	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R16	Var, MF, 500kΩ	RJ-6S 500kΩ	
R17	Var, MF, 20kΩ	RJ-6S 20kΩ	
R18	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R19	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R20	Not assigned		
R21	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R22	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R23	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R24	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R25	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R26	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R27	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R28	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R29	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R30	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R31	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R32	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R33	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R34	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R35	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R36	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R37	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R38	CF, 30kΩ, ±5%, 1/4W	ARD25T303J	
R39	Var, MF, 500kΩ	RJ-6S 500kΩ	
R40	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R41	CF, 47KΩ, ±5%, 1/4W	ARD25T473J	
R42	Var, MF, 100kΩ	RJ-6S 100kΩ	
R43	Not assigned		
R44	Not assigned		
R45	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R46	CF, 330Ω, ±5%, 1/4W	ARD25T331J	

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 3–6 Z5 Y OFFSET			
C1	Not assigned		
C2	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C3	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C4	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C5	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C6	Plast, 0.033 F, ±10%, 50V	ECQ-M05 333KZ	
C7	Elect, 33μF, ±20%, 16V	KX16VB-33	
C8	Elect, 33μF, ±20%, 16V	KX16VB-33	
C9	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C10	Not assigned		
C11	Elect, 4.7μF, ±20%, 63V	KX63VB-4.7	
C12	Plast, 0.1 F, ±10%, 50V	ECQ-M05 104KZ	
C13	Plast, 0.033μF, ±10%, 50V	ECQ-M05 333KZ	
C14	Elect, 1μF, ±20%, 63V	KX63VB-1	
C15	Elect, 33μF, ±20%, 16V	KX16VB-33	
C16	Elect, 33μF, ±20%, 16V	KX16VB-33	
C17	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C18	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C19	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C20	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C21	Not assigned		
C22	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C23	Not assigned		
C24	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C25	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
J1	Terminal (P)	60599-3	
J2	Terminal (P)	60599-3	
Q1	Di, Si	1S953	
Q2	IC	74LS10	
Q3	IC	74LS138	
Q4	IC	74LS76	
Q5	J-FET, Nch	2SK12	
Q6	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q7	IC	TC4520BP	
Q8	IC	TC4013BP	
Q9	IC	TC4051BP	
Q10	Not assigned		
Q11	IC	μPC258C	
Q12	IC	TC4053BP	
Q13	Di, Si	1S953	
Q14	Di, Si	1S953	
Q15	Di, Si	1S953	
Q16	IC	2SC251C	
Q17	Tr, Si, NPN	2SC1833	
Q18	Tr, Si, NPN	2SC1833	
Q19	Tr, Si, NPN	2SC1833	
Q20	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q21	IC	TC4053BP	
Q22	J-FET, Nch	2SK12	
Q23	IC	μPC251C	
Q24	IC	μPC251C	
Q25	Di, Si	1S953	
Q26	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q27	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q28	IC	μPC71A	
Q29	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q30	Di, Si	1S953	
Q31	Di, Si	1S953	
Q32	IC	74LS00	
Q33	IC	FS-7805L	
Q34	IC	TC4053BP	
Q35	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q36	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q37	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
R1	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R2	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R3	Not assigned		
R4	Not assigned		
R5	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R6	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R7	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R8	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R9	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R10	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-6. Z5 Y OFFSET (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R11	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R12	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R13	CF, 560Ω, ±5%, 1/4W	ARD25T561J	
R14	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R15	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R16	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R17	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R18	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R19	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R20	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R21	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R22	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R23	Not assigned		
R24	Not assigned		
R25	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R26	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R27	Not assigned		
R28	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R29	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R30	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R31	MF, 29.4kΩ, ±0.5%, 1/4W	RN14K2E2942D	
R32	MF, 147kΩ, ±0.5%, 1/4W	RN14K2E1473D	
R33	MF, 29.4kΩ, ±0.5%, 1/4W	RN14K2E2942D	
R34	Not assigned		
R35	MF, 14.7kΩ, ±0.5%, 1/4W	RN14K2E1472D	
R36	MF, 29.4kΩ, ±0.5%, 1/4W	RN14K2E2942D	
R37	MF, 147kΩ, ±0.5%, 1/4W	RN14K2E1473D	
R38	MF, 147kΩ, ±0.5%, 1/4W	RN14K2E1473D	
R39	MF, 147kΩ, ±0.5%, 1/4W	RN14K2E1473D	
R40	Not assigned		
R41	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R42	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R43	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R44	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R45	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R46	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R47	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R48	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R49	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R50	Not assigned		
R51	CF, 75kΩ, ±5%, 1/4W	ARD25T753J	
R52	CF, 75kΩ, ±5%, 1/4W	ARD25T753J	
R53	CF, 330kΩ, ±5%, 1/4W	ARD25T334J	
R54	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R55	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R56	Var, MF, 2kΩ	RJ-6S 2kΩ	
R57	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R58	Not assigned		
R59	Var, MF, 1kΩ	RJ-6S 1kΩ	
R60	Not assigned		
R61	Not assigned		
R62	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R63	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R64	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R65	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R66	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R67	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R68	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R69	MF, 30.1kΩ, ±0.5%, 1/4W	RN14K2E3012D	
R70	Not assigned		
R71	Var, MF, 10kΩ	RJ-6S 10kΩ	
R72	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R73	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R74	Var, MF, 10kΩ	RJ-6S 10kΩ	
R75	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R76	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R77	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R78	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R79	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R80	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R81	Var, MF, 1kΩ	RJ-6S 1kΩ	
R82	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R83	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R84	Not assigned		
R85	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R86	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R87	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R88	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R89	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R90	CF, 330Ω, ±5%, 1/4W	ARD25T331J	

CKT REF	DESCRIPTION	PART NAME	NOTE
R91	Not assigned		
R92	Not assigned		
R93	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R94	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R95	Not assigned		
R96	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R97	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R98	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R99	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R100	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R101	CF, 1k to 1M Ω, ±5%, 1/4W	ARD25T * 5J	*

Table 3-7 Z6 CPU BOARD

C1	Cer, 22pF, ±5%, 50V	CC92CH1H220JY	
C2	Cer, 22pF, ±5%, 50V	CC92CH1H220JY	
C3	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C4	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C5	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C6	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C7	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C8	Not assigned		
C9	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
J1	Connector	HIF3-20P-2.54DS	20P
J2	Connector with flat cable	44J64473	26P
L1	Not assigned		
L2	Microinductor, 100μH	LF8-101K	
Q1	IC	P8035L or μPD8035LC	
Q2	IC	μPB8212C	
Q3	IC	μPB417D	
Q4	IC	μPB417D	
Q5	IC	μPB417D	
Q6	IC	74LS05	
Q7	IC	74LS00	
Q8	IC	TC4030BP	
Q9	IC	TC4072BP	
Q10	IC	TC4042BP	
Q11	IC	74LS10	
Q12	IC	74LS10	
Q13	Not assigned		
Q14	IC	HM46810P	
Q15	IC	TC4001BP	
Q16	IC	TC4011BP	
Q17	Not assigned		
Q18	Di, Si	1S953	
Q19	IC	MC14503BCP	
Q20	IC	MC14503BCP	
Q21	IC	MC14503BP	
R1	Single-in, line type, array, 4.7kΩx8, 1/8W	IHR-8-472JA	
R2	Single-in, line type, array, 4.7kΩx8, 1/8W	IHR-8-472JA	
R3	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R4	Single-in, line type, array, 4.7kΩx8, 1/8W	IHR-8-472JA	
R5	Single-in, line type, array, 4.7kΩx8, 1/8W	IHR-8-472JA	
R6	Single-in, line type, array, 4.7kΩx10, 1/8W	IHR-10-472JA	
R7	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R8	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R9	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 3–8 Z7 A/D INTERFACE			
C1	Elect, 33μF, ±20%, 16V	KX16VB-33	
C2	Tant, 2.2μF, ±20%, 20V	CS02H1D2R2	
C3	Not assigned		
C4	Not assigned		
C5	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C6	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C7	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C8	Plast, 0.015μF, ±10%, 50V	ECQ-M05 153KZ	
C9	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C10	Not assigned		
C11	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C12	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C13	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C14	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C15	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
J1	Connector	PI021-02M	2P
K1	Reed relay	PRAD-4	
K2	Reed relay	PRAD-4	
Q1	Di, breakdown, 7.0 to 8.4V, 400mW	RD7.5E	
Q2	Di, breakdown, 7.0 to 8.4V, 400mW	RD7.5E	
Q3	IC	μPC251C	
Q4	IC	TC4051BP	
Q5	IC	μPC151C	
Q6	Not assigned		
Q7	IC	TC4053BP	
Q8	A/D Converter	MC14433P	
Q9	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q10	Di, breakdown, 6.1 to 6.7V, 250mW	1SZ47A	
Q11	IC	MC14503BCP	
Q12	IC	MC14503BCP	
Q13	IC	TC4508BP	
Q14	IC	TC4508BP	
Q15	IC	μPC251C	
Q16	IC	TC4011BP	
Q17	IC	TC4011BP	
Q18	IC	TC4028BP	
Q19	IC	TC4049BP	
Q20	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q21	IC	74LS38	
Q22	IC	TC4042BP	
Q23	IC	TC4042BP	
Q24	IC	TC4053BP	
Q25	IC	μPC251C	
Q26	Di, Si	1S953	
Q27	Tr, Si, PNP	2SA883	
Q28	Tr, Si, NPN	2SC1833	
R1	MF, 10kΩ, ±0.5%, 1/8W	RN05C2B1002D	
R2	MF, 10kΩ, ±0.5%, 1/8W	RN05C2B1002D	
R3	MF, 10kΩ, ±0.5%, 1/8W	RN05C2B1002D	
R4	MF, 10kΩ, ±0.5%, 1/8W	RN05C2B1002D	
R5	Not assigned		
R6	MF, 2.32kΩ to 2.67kΩ, ±0.5%, 1/8W	RN55S*kΩD	*
R7	MF, 2.32kΩ to 2.67kΩ, ±0.5%, 1/8W	RN55S*kΩD	*
R8	MF, 2.43k to 2.49kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R9	MF, 2.43k to 2.49kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R10	Var, MF, 200Ω	RJ-6S 200Ω	
R11	Var, MF, 200Ω	RJ-6S 200Ω	Q'ty 0 or 1*
R12	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R13	Not assigned		
R14	Var, MF, 10kΩ	RJ-6S 10kΩ	
R15	MF, 10kΩ, 0.025%, 1/4W	RN60S 10kΩE	
R16	MF, 416.7Ω, 0.025%, 1/4W	RN60S 416.7ΩE	
R17	MF, 2.5kΩ, 0.025%, 1/4W	RN60S 2.5kΩE	
R18	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R19	MF, 9.09kΩ, ±0.5%, 1/4W	RN14K2E9091D	
R20	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R21	MF, 3.16kΩ, ±0.5%, 1/8W	RN55S 3.16kΩD	
R22	MF, 243Ω, ±0.5%, 1/4W	RN14K2E2430D	
R23	Var, WW, 20kΩ	μ-8P 20kΩ	
R24	MF, 100kΩ, ±0.5%, 1/4W	RN60S 100kΩD	
R25	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R26	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R27	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R28	CF, 100kΩ to 220kΩ, ±5%, 1/4W	ARD25T*J	*
R29	Var, MF, 20kΩ	RJ-6S 20kΩ	
R30	Var, MF, 100kΩ	RJ-6S 100kΩ	
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R33	CF, 4.7kΩ to 5.6kΩ, ±5%, 1/4W	ARD25T*J	
R34	Var, MF, 2kΩ	RJ-6S 2kΩ	*
R35	MF, 9.39kΩ to 11.5kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R36	MF, 10kΩ to 11.5kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R37	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R38	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R39	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R40	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R41	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R42	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R43	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R44	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R45	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R46	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R47	Var, MF, 5kΩ	RJ-6S 5kΩ	
R48 to R58	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R59 to R68	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R69	MF, 68.1kΩ, ±0.5%	RN14K2E6812D	
R70	Not assigned		
R71	CF, 100Ω to 120Ω, ±5%, 1/4W	ARD25T*J	*
R72	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R73	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R74	CF, 3.3kΩ to 6.8kΩ, ±5%, 1/4W	ARD25T*J	*
R75	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	Q'ty 0 or 1,*
R76	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	Q'ty 0 or 1, *
R77	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R78	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R79	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R80	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R81	CF, 22kΩ to 150kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R82	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	Q'ty 0 or 1 *
R83	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	Q'ty 0 or 1 *
R84	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	Q'ty 0 or 1 *
R85	CF, 100Ω to 2.2kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1 *
Table 3–9 Z8 AMPLIFIER			
C1	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C2	Not assigned		
C3	Tant, 33μF, ±20%, 10V	CS02H1A330M	
C4	Elect, 47μF, ± 20%, 16V	KX16VB-47	
C5	Elect, 47μF, ± 20%, 16V	KX16VB-47	
C6	Not assigned		
C7	Not assigned		
C8	Not assigned		
C9	Not assigned		
C10	Not assigned		
C11	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C12	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C13	Not assigned		
C14	Not assigned		
C15	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C16	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C17	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C18	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C19	Not assigned		
C20	Not assigned		
C21	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C22	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C23	Not assigned		
C24	Tant, 0.47μF, ±20%, 35V	CS02H1VR47M	
C25	Tant, 0.47μF, ±20%, 35V	CS02H1VR47M	
C26	Cer, 68pF, ±5%, 50V	CC92CH1H680JY	
C27	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C28	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C29	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C30	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
J1	Connector	U-SB2250	22P
J2	Connector	HIF3-34P-2.54DSA	34P
K1	Reed relay	PRAD-4	
K2	Reed relay	PRAD-4	
K3	Relay	NF4-12V	
K4	Relay	NF2-12V	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-9. Z8 AMPLIFIER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q1	IC	μPC258C	
Q2	IC	μPC251C	
Q3	IC	μPC251C	
Q4	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q5	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q6	IC	TC4053BP	
Q7	IC	μPC251C	
Q8	IC	μPA39A	
Q9	IC	74LS38	
Q10	IC	FS7805L	
Q11	IC	TC4049BP	
Q12	IC	TC4011BP	
Q13	IC	TC4053BP	
Q14	Not assigned		
Q15	Di, breakdown, 7.7 to 9.3V, 400mW	RD8.2E	
Q16	Tr, Si, NPN	2SC1833	
Q17	Di, Si	1S953	
Q18	IC	TC4053BP	
Q19	Di, Si	1S953	
Q20	Di, Si	1S953	
Q21	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q22	Di, Si	1S953	
Q23	Di, Si	1S953	
R1	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R2	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R3	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R4	Not assigned		
R5	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R6	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R7	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R8	Not assigned		
R9	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R10	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R11	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R12	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R13	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R14	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R15	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R16	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R17	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R18	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R19	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R20	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R21	Var, MF, 50kΩ	RJ-6P 50kΩ	
R22	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R23	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R24	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R25	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R26	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R27	Var, MF, 50kΩ	RJ-6P 50kΩ	
R28	CF, 470kΩ, ±5%, 1/4W	ARD25T474J	
R29	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R30	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R31	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R32	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R33	MF, 990kΩ, ±0.1%, 1/8W	RN05E2E9903B	
R34	MF, 9kΩ, ±0.1%, 1/8W	RN05E2E9001B	
R35	MF, 99kΩ, ±0.1%, 1/8W	RN05E2E9902B	
R36	MF, 11Ω to 100kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R37	MF, 11Ω to 100kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R38	CF, 15kΩ, ±0.5%, 1/4W	ARD25T153J	
R39	CF, 15kΩ, ±0.5%, 1/4W	ARD25T153J	
R40	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R41	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R42	Var, MF, 10kΩ	RJ-6P 10kΩ	
R43	MF, 2.21kΩ, ±0.5%, 1/4W	RN14K2E2211D	
R44	Var, MF, 500kΩ	RJ-6P 500kΩ	
R45	Not assigned		
R46	MF, 9.31kΩ, ±0.5%, 1/4W	RN14K2E9311D	
R47	Var, MF, 2kΩ	RJ-6P 2kΩ	
R48	MF, 768Ω, ±0.5%, 1/4W	RN14K2E7680D	
R49	CF, 6.8Ω, ±5%, 1/4W	ARD25T6R8J	
R50	WW, 60Ω	442R42845	
R51	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R52	Not assigned		
R53	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R54	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R55	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R56	Not assigned		
R57	Not assigned		
R58	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R59	CF, 62kΩ, ±5%, 1/4W	ARD25T623J	
R60	Var, MF, 10kΩ to 20kΩ	RJ-6P 10kΩ or 20kΩ	*
R61	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R62	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R63	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R64	MF, 6.81kΩ, ±0.5%, 1/4W	RN14K2E6811D	
R65	Var, MF, 2kΩ	RJ-6P 2kΩ	

Table 3–10 Z9 CONNECTOR BOARD

CKT REF	DESCRIPTION	PART NAME	NOTE
J1	Receptacle	R15A-17R-16PB	16P
J2	Receptacle	R15A-17R-16PB	16P
J3	Connector	U-PB2221	22P

Table 3–11 Z10 REFERENCE OSC

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C2	Cer, 1000pF, +100/–0%, 50V	DF553F102PY50	
C3	Cer, 1000pF, +100/–0%, 50V	DF553F102PY50	
C4	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C5	Not assigned		
C6	Not assigned		
C7	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C8	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C9	Cer, 7pF, ±0.5pF, 50V	CC92CH1H070DY	
C10	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C11	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C12	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C13	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C14	Cer, 180pF, ±2%, 50V	RPE111CH181G50	
J1	Connector	PI011-02F	2P
J2	Not assigned		
J3	Connector	N-R	44J60246
L1	Variable inductor, 0.4 to 0.7μH	439T22960	
L2	Microinductor, 4.7μH	LF4-4R7K	
L3	Microinductor, 0.04μH	44L63289	
Q1	Di, breakdown, 6.1 to 6.7V, 250mW	1SZ47A	
Q2	IC	μPC251C	
Q3	Di, Si, SB	1SS97	
Q4	Di, Si, SB	1SS97	
Q5	Not assigned		
Q6	Di, varicap	FC51	
Q7	Tr, Si, NPN	2SC1044	
R1	MF, 5.11kΩ, ±0.5%, 1/4W	RN14K2E5111D	
R2	Not assigned		
R3	MF, 6.81k to 15kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R4	Var, WW, 1kΩ	K-9W 1kΩ	
R5	MF, 4.64k to 10kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R6	MF, 7.5kΩ, ±0.5%, 1/4W	RN14K2E7501D	
R7	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R8	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R9	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R10	MF, 215Ω, ±0.5%, 1/4W	RN14K2E2150D	
R11	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R12	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R13	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R14	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R15	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R16	MF, 50.0Ω, ±0.5%, 1/4W	NRN1/4C4 50.0ΩD	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 3–12 Z11 MARKER BOARD			
J1	Connector	PI011-03M	3P
Q1	Di, breakdown, 5.9 to 6.5V, 250mW	1SZ52	
R1	CF, 560Ω, ± 5%, 1/4W	ARD25T561J	
R2	Var, MF, 1kΩ	RJ-6P 1kΩ	
R3 to R22	MF, 100Ω, ±0.5%, 1/4W	RN14K2E1000D	
S1	Rotary switch	RP7X1124BG	
Table 3–13 Z12 LED BOARD			
C1	Not assigned		
C2	Elect, 100μF, ±20%, 25V	KX25VB-100	
C3	Elect, 100μF, ±20%, 25V	KX25VB-100	
J1	Connector	HIF3-34P-2.54DSA	34P
J2	Connector	PI011-03F	3P
Q1	IC	74145	
Q2	IC	MC14511B	
Q3	Not assigned		
Q4	LED	5082-7656	
Q5	LED	5082-7653	
Q6	LED	5082-7653	
Q7	LED	5082-7653	
Q8	LED	5082-7653	
Q9	LED	SR105W	
Q10	Not assigned		
Q11	LED	SR105W	
Q12	LED	SR105W	
Q13	LED	SR105W	
Q14	LED	SR105W	
Q15	LED	SR105W	
Q16	LED	SR105W	
Q17	LED	SR105W	
Q18	Tr, Si, PNP	2SA883	
R1	Not assigned		
R2	Not assigned		
R3	Not assigned		
R4	Var, MF, 1kΩ	RG161N25SB1kΩ	
R5	Var, MF, 20kΩ	RG161N25SB20kΩ	
R6	Var, MF, 10kΩ	RG161N25SB10kΩ	
R7	Var, MF, 20kΩ	RG161N15SB20kΩ	
R8	DIL type, array, 22Ω×8, ±5%, 0.8W	OHR-8-220JB1	
R9	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R10	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R11	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R12	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
S1	Pushbutton	1F2U0A	
Table 3–14 Z13 PRE AMP			
C1	Cer, 470pF, ±5%, 50V	RPE111CH471JY50	Q'ty 0 or 1, *
C2	Cer, 22pF, ±5%, 50V	CC92CH1H220JY	
C3	Cer, 22pF, ±5%, 50V	CC92CH1H220JY	Q'ty 0 or 1, *
C4	Not assigned		
C5	Plast, 1000pF, ±10%, 50V	ECQ-M05 102KZ	
C6	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C7	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C8	Elect, 47μF, ±20%, 10V	KX10VB-47	
C9	Elect, 47μF, ±20%, 10V	KX10VB-47	
C10	Elect, 10μF, ±20%, 50V	KX50VB-10	
C11	Cer, 0.5pF, ±0.25pF, 50V	RD340CK0R5CY50	Q'ty 0 or 1, *
C12	Cer, 4pF, ±0.25pF, 50V	RD340CK040CY50	Q'ty 0 or 1, *
C13	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
J1	Connector	U-PB1521	15P
J2	Connector	U-PB2221	22P
J3	Connector	U-PB2221	22P
J4	Not assigned		
J5	Terminal (P)	60599-3	
J6	Terminal (P)	60599-3	
J7	Terminal (P)	60599-3	
J8	Terminal (P)	60599-3	
J9	Connector	PI011-02M	2P
J10	Not assigned		
J11	Connector	PI011-03M	3P
J12	Connector	PI011-03M	3P
Q1	FET, Nch	2SK18A	
Q2	IC	CA3130T	
Q3	Not assigned		
Q4	IC	μPC251C	
Q5	Tr, Si, NPN	2SC1833	
Q6	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q7	Di, breakdown, 7.0 to 8.4V, 400mW	RD7.5E	
Q8	Di, breakdown, 7.0 to 8.4V, 400mW	RD7.5E	
R1	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R2	CF, 10k to 47kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 1 or 2, *
R3	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R4	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R5	MF, 3.3kΩ, ±0.5%, 1/4W	RN14K2E3301D	
R6	MF, 680Ω, ±0.5%, 1/4W	RN14K2E6800D	
R7	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R8	CF, 10k to 47kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 1 or 2, *
R9	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R10	CF, 9.09kΩ, ±0.5%, 1/4W	ARD25T9091D	
R11	MF, 1k to 1MΩ, ±0.5%, 1/4W	RN14K2E*D	Q'ty 1 to 3, in parallel, *
R12	Var, MF, 500Ω	RJ-6P 500Ω	
R13	Not assigned		
R14	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R15	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R16	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R17	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R18	CF, 470kΩ, ±5%, 1/4W	ARD25T474J	
R19	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R20	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R21	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R22	Not assigned		
R23	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R24	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R25	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R26	CF, 330kΩ, ±5%, 1/4W	ARD25T334J	
R27	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R28	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R29	CF, 100k to 1MΩ, ±5%, 1/4W	ARD25T*J	
R30	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R31	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R32	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R33	Not assigned		
R34	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R35	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
S1	Pushbutton	44S62539	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3–15 Z14 SPECTRUM

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Plast, 0.015μF, ±10%, 50V	ECQ-M05 153KZ	
C2	Elect, 47μF, ±20%, 10V	KX10VB-47	
C3	Not assigned		
C4	Elect, 47μF, ±20%, 16V	KX16VB-47	
C5	Elect, 47μF, ±20%, 16V	KX16VB-47	
C6	Not assigned		
C7	Not assigned		
C8	Plast, 0.033μF, ±10%, 50V	ECQ-M05 333KZ	
C9	Not assigned		
C10	Not assigned		
C11	Elect, 1μF, ±20%, 63V	KX63VB-1	
C12	Plast, 0.1μF, ±10%, 50V	ECQ-M05104KZ	
C13	Plast, 0.1μF, ±10%, 50V	ECQ-M05104KZ	
C14	Elect, 1μF, ±20%, 63V	KX63VB-1	
C15	Elect, 1μF, ±20%, 63V	KX63VB-1	
C16	Elect, 1μF, ±20%, 63V	KX63VB-1	
C17	Elect, 47μF, ±20%, 10V	KX10VB-47	
C18	Cer, 5 to 47pF, ±5%, 50V	CC92CH1H*JY	Q'ty 2, in Parallel,*
C19	Cer, 10 to 100pF. ±5%, 50V	CC92CH1H*JY	Q'ty 2, in Parallel,*
C20	Cer, 5 to 47pF, ±5%, 50V	CC92CH1H*JY	Q'ty 2, in Parallel,*
C21	Not assigned		
C22	Not assigned		
C23	Not assigned		
C24	Not assigned		
C25	Elect, 1μF, ±20%, 63V	KX63VB-1	
C26	Elect, 1μF, ±20%, 63V	KX63VB-1	
C27	Elect, 1μF, ±20%, 63V	KX63VB-1	
C28	Elect, 1μF, ±20%, 63V	KX63VB-1	
C29	Elect, 1μF, ±20%, 63V	KX63VB-1	
C30	Not assigned		
C31	Not assigned		
C32	Elect, 100μF, 16V	KX16T-100	
C33	Elect, 100μF, 16V	KX16T-100	
C34	Elect, 47μF, ±20%, 10V	KX10VB-47	
C35	Elect, 330μF, 16V	KX16T-330	
C36	Elect, 47μF, ±20%, 10V	KX10VB-47	
C37	Elect, 47μF, ±20%, 10V	KX10VB-47	
C38	Elect, 1μF, ±20%, 63V	KX63VB-1	
C39	Elect, 3.3μF, ±20%, 63V	KX63VB-3.3	
C40	Elect, 1μF, ±20%, 63V	KX63VB-1	
C41	Elect, 1μF, ±20%, 63V	KX63VB-1	
C42	Cer, 10pF, ±5%, 50V	CC92CH1H100JY	
C43	Plast, 0.033μF, ±10%, 50V	ECQ-M05 333KZ	
C44	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C45	Plast, 0.033μF, ±10%, 50V	ECQ-M05 333KZ	
C46	Not assigned		
C47	Elect, 33μF, ±20%, 16V	KX16VB-33	
C48	Elect, 33μF, ±20%, 16V	KX16VB-33	
C49	Elect, 33μF, ±20%, 16V	KX16VB-33	
C50	Not assigned		
C51	Plast, 0.0033μF, ±10%, 50V	ECQ-M05 332KZ	
C52	Plast, 0.0033μF, ±10%, 50V	ECQ-M05 332KZ	
C53	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C54	Not assigned		
C55	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C56	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C57	Plast, 0.033μF, ±10%, 50V	ECQ-M05 333KZ	
C58	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C59	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C60	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C61	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
J1	Terminal (P)	60599-3	
J2	Terminal (P)	60599-3	
J3	Receptacle	3C-R	
J4	Connector	U-SA1001	10P
K1	Relay	NF2-DC12V	
L1	Not assigned		
L2	Microinductor, 10mH	LH1-103K	
L3	Microinductor, 33mH	LH1-333K	
L4	Microinductor, 10mH	LH1-103K	
L5	Not assigned		
L6	Not assigned		
L7	Not assigned		
L8	Microinductor, 1mH	LH1-102K	
L9	Not assigned		
L10	Not assigned		
L11	Coil, 0.15μH	SP0408-R15K	
L12	Coil, 0.15μH	SP0408-R15K	
L13	Not assigned		
L14	Not assigned		
L15	Not assigned		
L16	Not assigned		
L17	Not assigned		
L18	Not assigned		
L19	Microinductor, 33mH	LH1-333K	
L20	Microinductor, 470μH	LH1-471K	
L21	Microinductor, 10mH	LH1-103K	
Q1	Tr, Si, NPN	2SC1833	
Q2	Tr, Si, NPN	2SC1833	
Q3	Tr, Si, NPN	2SC1833	
Q4	Tr, Si, NPN	2SC1833	
Q5	Tr, Si, NPN	2SC1833	
Q6	Tr, Si, NPN	2SC1833	
Q7	Tr, Si, NPN	2SC1833	
Q8	Tr, Si, NPN	2SC1833	
Q9	Tr, Si, NPN	2SC1833	
Q10	Not assigned		
Q11	Tr, Si, NPN	2SC1833	
Q12	Tr, Si, NPN	2SC1833	
Q13	Tr, Si, NPN	2SC1833	
Q14	Tr, Si, NPN	2SC1833	
Q15	Tr, Si, NPN	2SC1833	
Q16	Tr, Si, NPN	2SC1833	
Q17	Tr, Si, NPN	2SC1833	
Q18	Tr, Si, NPN	2SC1833	
Q19	Tr, Si, NPN	2SC1833	
Q20	Not assigned		
Q21	Tr, Si, NPN	2SC1833	
Q22	Tr, Si, NPN	2SC1833	
Q23	Tr, Si, NPN	2SC1833	
Q24	Tr, Si, NPN	2SC1833	
Q25	Tr, Si, NPN	2SC1833	
Q26	Tr, Si, NPN	2SC1010	
Q27	IC	FS-7805L	
Q28	Tr, Si, NPN	2SC1275	
Q29	Not assigned		
Q30	Not assigned		
Q31	Not assigned		
Q32	Not assigned		
Q33	Not assigned		
Q34	Not assigned		
Q35	Not assigned		
Q36	Tr, Si, PNP	2SA883	
Q37	Tr, Si, PNP	2SA883	
Q38	Tr, Si, PNP	2SA883	
Q39	Tr, Si, NPN	2SC1833	
Q40	Not assigned		
Q41	Tr, Si, NPN	2SC1833	
Q42	Tr, Si, NPN	2SC1833	
Q43	Di, Si	1SS97	
Q44	Di, Si	1SS97	
Q45	IC	CA3130T	
Q46	Not assigned		
Q47	IC	TC4053BP	
Q48	IC	μPC251C	
Q49	Di, Si	1S953	
Q50	Di, Si	1S953	
Q51	Tr, Si, NPN	2SC1833	
R1	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R2	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R3	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R4	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R5	CF, 47Ω to 1kΩ, ±5%, 1/4W	ARD25T*J	*

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-15. Z14 SPECTRUM (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R6	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R7	CF, 600Ω, ±5%, 1/4W	ARD25T601J	
R8	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R9	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R10	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R11	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R12	CF, 1k to 2.2kΩ, ±5%, 1/4W	ARD25T*J	*
R13	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R14	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R15	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R16	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R17	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R18	MF, 475Ω, ±0.5%, 1/4W	RN14K2E4750D	
R19	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R20	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R21	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R22	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R23	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R24	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R25	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R26	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R27	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R28	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R29	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R30	Not assigned		
R31	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R32	MF, 475Ω, ±0.5%, 1/4W	RN14K2E4750D	
R33	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R34	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R35	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R36	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R37	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R38	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R39	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R40	Not assigned		
R41	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R42	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R43	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R44	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R45	MF, 475Ω, ±0.5%, 1/4W	RN14K2E4750D	
R46	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R47	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R48	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R49	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R50	Not assigned		
R51	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R52	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R53	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R54	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R55	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R56	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R57	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R58	MF, 475Ω, ±0.5%, 1/4W	RN14K2E4750D	
R59	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R60	Not assigned		
R61	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R62	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R63	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R64	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R65	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R66	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R67	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R68	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R69	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R70	Not assigned		
R71	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R72	MF, 475Ω, ±0.5%, 1/4W	RN14K2E4750D	
R73	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R74	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R75	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R76	MF, 665Ω, ±0.5%, 1/4W	RN14K2E6650D	
R77	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R78	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R79	Not assigned		
R80	Not assigned		
R81	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R82	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R83	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R84	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R85	CF, 4.7Ω to 1kΩ, ±5%, 1/4W	ARD25T*J	*
R86	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R87	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R88	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R89	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R90	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R91	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R92	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R93	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R94	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R95	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R96	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R97	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R98	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R99	CF, 390Ω, ±5%, 1/4W	ARD25T391J	
R100	Not assigned		
R101	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R102	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R103	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R104	Not assigned		
R105	Not assigned		
R106	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R107	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R108	MF, 150Ω, ±0.5%, 1/4W	RN14K2E1500D	
R109	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R110	Not assigned		
R111	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R112	MF, 1.74kΩ, ±0.5%, 1/4W	RN14K2E1741D	
R113	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R114	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R115	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R116	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R117	CF, 560Ω, ±5%, 1/4W	ARD25T561J	
R118	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R119	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R120	Not assigned		
R121	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R122	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R123	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R124	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R125	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R126	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R127	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R128	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R129	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R130	Not assigned		
R131	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R132	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R133	Var, MF, 5kΩ	RJ-6P 5kΩ	
R134	Var, MF, 5kΩ	RJ-6P 5kΩ	
R135	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R136	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R137	Var, MF, 2kΩ	RJ-6P 2kΩ	
R138	Not assigned		
R139	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R140	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R141	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R142	Not assigned		
R143	Not assigned		
R144	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R145	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R146	Var, MF, 1kΩ	RJ-6P 1kΩ	
R147	Var, MF, 1kΩ	RJ-6P 1kΩ	
R148	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R149	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
Z1	MIXER	SBL-1C	

Table 3-16 Z15 IF LINEARIZER

C1	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C2	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C3	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C4	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C5	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C6	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
J1	Connector	HIF3-26P-2.54DS	26P
Q1	IC	μPC251C	
Q2	Di, breakdown, 10.4 to 12.2V, 400mW	RD11E	
Q3	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q4	Di, breakdown, 10.4 to 12.2V, 400mW	RD11E	
Q5	IC	TC4053BP	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-16. Z15 IF LINEARIZER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q6	IC	μPC251C	
Q7	IC	μPC251C	
Q8	Di, Si	1S953	
Q9	Di, Si	1S953	
Q10	Di, Si	1S953	
Q11	Di, Si	1S953	
Q12	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	Q'ty 0 or 1*
Q13	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q14	IC	μPC251C	
Q15	Not assigned		
Q16	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q17	Not assigned		
Q18	Not assigned		
Q19	Not assigned		
Q20	IC	μPB417D	
R1	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R2	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R3	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R4	CF, 10k to 1MΩ, ±5%, 1/4W	ARD25T*J	*
R5	MF, 4.99kΩ, ±0.5%, 1/4W	RN14K2E4991D	
R6	Var, MF, 10kΩ	RJ-6S 10kΩ	
R7	Var, MF, 10kΩ	RJ-6S 10kΩ	
R8	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R9	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R10	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R11	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R12	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R13	MF, 5.11kΩ, ±0.5%, 1/4W	RN14K2E5111D	
R14	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R15	MF, 8.25kΩ, ±0.5%, 1/4W	RN14K2E8251D	
R16	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R17	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R18	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R19	CF, 10 to 330Ω, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1, *
R20	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R21	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R22	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R23	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R24	Var, MF, 10kΩ	RJ-6S 10kΩ	
R25	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R26	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R27	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R28	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R29	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R30	Not assigned		
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	Var, MF, 100kΩ	RJ-6S 100kΩ	
R33	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R34	Var, MF, 100kΩ	RJ-6S 100kΩ	
R35	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R36	CF, 33kΩ to 150kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R37	CF, 10K to 1MΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R38	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R39	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R40	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R41	Not assigned		
R42	Not assigned		
R43	Not assigned		
R44	Not assigned		
R45	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R46	MF, 68.1kΩ, ±0.5%, 1/4W	RN14K2E6812D	
R47	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R48	Var, MF, 10kΩ	RJ-6S 10kΩ	
R49	MF, 68.1kΩ, ±0.5%, 1/4W	RN14K2E6812D	
R50	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R51	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	
R52	Var, MF, 2kΩ	RJ-6S 2kΩ	
R53	MF, 8.25kΩ, ±0.5%, 1/4W	RN14K2E8251D	
R54	Not assigned		
R55	CF, 18kΩ, ±5%, 1/4W	ARD25T183J	
R56	Var, MF, 10kΩ	RJ-6S 10kΩ	
R57	Var, MF, 5kΩ to 50kΩ	RJ-6S 5kΩ to 50kΩ	
R58	CF, 6.8k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R59	CF, 0 to 10kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R60	CF, 10Ω to 15kΩ, ±5%, 1/4W	ARD25T*J	*
R61	CF, 0 to 1MΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R62	CF, 10k to 1MΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*

Table 3–17 Z16 RF LINEARIZER

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C2	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C3	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C4	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C5	Not assigned		
C6	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
J1	Connector	HIF3-26P-2.54DS	26P
Q1	IC	μPC251C	
Q2	Di, breakdown, 10.4 to 12.2V, 400mW	RD11E	
Q3	Di, breakdown, 4.8 to 5.7V, 400mW	RD5.1E	
Q4	Di, breakdown, 10.4 to 12.2V, 400mW	RD11E	
Q5	IC	TC4053BP	
Q6	IC	μPC251C	
Q7	IC	μPC251C	
Q8	Di, Si	1S953	
Q9	Di, Si	1S953	
Q10	Di, Si	1S953	
Q11	Di, Si	1S953	
Q12	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q13	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	Q'ty 0 or 1*
Q14	IC	μPC251C	
Q15	Not assigned		
Q16	Di, breakdown, 5.8 to 7.0V, 400mW	RD6.2E	
Q17	Not assigned		
Q18	Not assigned		
Q19	Not assigned		
Q20	IC	μPB417D	
R1	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R2	MF, 17.8kΩ, ±0.5%, 1/4W	RN14K2E1782D	
R3	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R4	CF, 10k to 1MΩ, ±5%, 1/4W	ARD25T*J	*
R5	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R6	Var, MF, 10kΩ	RJ-6S 10kΩ	
R7	Var, MF, 10kΩ	RJ-6S 10kΩ	
R8	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R9	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R10	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R11	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R12	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R13	MF, 5.11kΩ, ±0.5%, 1/4W	RN14K2E5111D	
R14	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R15	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R16	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R17	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R18	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R19	CF, 10 to 330Ω, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1, *
R20	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R21	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R22	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R23	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R24	Var, MF, 10kΩ	RJ-6S 10kΩ	
R25	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R26	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R27	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R28	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R29	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R30	Not assigned		
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	Var, MF, 100kΩ	RJ-6S 100kΩ	
R33	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R34	Var, MF, 100kΩ	RJ-6S 100kΩ	
R35	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R36	CF, 33kΩ to 150kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R37	CF, 10kΩ to 150kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R38	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R39	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R40	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R41	Not assigned		
R42	Not assigned		
R43	Not assigned		
R44	Not assigned		
R45	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-17. Z16 RF LINEARIZER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R46	MF, 68.1kΩ, ±0.5%, 1/4W	RN14K2E6812D	
R47	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R48	Var, MF, 10kΩ	RJ-6S 10kΩ	
R49	MF, 68.1kΩ, ±0.5%, 1/4W	RN14K2E6812D	
R50	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R51	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	
R52	Var, MF, 2kΩ	RJ-6S 2kΩ	
R53	MF, 8.25kΩ, ±0.5%, 1/4W	RN14K2E8251D	
R54	Not assigned		
R55	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R56	Var, MF, 10kΩ	RJ-6S 10kΩ	
R57	Var, MF, 5kΩ to 50kΩ	RJ-6S 5kΩ to 50kΩ	
R58	CF, 6.8k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R59	CF, 0 to 10kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R60	CF, 0 to 15kΩ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R61	CF, 10k to 1MΩ, ±5%, 1/4W	ARD25T*J	*
R62	CF, 10k to 1MΩ, ±5%, 1/4W	ARD25T*J	*

Table 3–18 Z17 RETURN LOSS (RF)

C1	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C2	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C3	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C4	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C5	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C6	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C7	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C8	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C9	Cer, 220pF, ±5%, 50V	RPE111CH221JY50	
C10	Cer, 150pF, ±5%, 50V	RD312CH151JY50	
C11	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C12	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C13	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C14	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C15	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C16	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C17	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C18	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C19	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C20	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C21	Cer, 47pF, ±5%, 50V	CC92CH1H470JY	
J1	Connector	PI011-02M	2P
J2	Connector	U-PB1521	15P
K1	Reed relay	PRAD-4	
Q1	Tr, Si, NPN	2SC1010	
Q2	IC	μPC258C	
Q3	IC	TC4053BP	
Q4	Di, breakdown, 5.8 to 6.6V, 400mW	RD6.2EB	
Q5	Di, breakdown, 5.8 to 6.6V, 400mW	RD6.2EB	
Q6	Tr, Si, NPN	2SC1833	
Q7	Tr, Si, NPN	2SC1833	
Q8	Tr, Si, PNP	2SA883	
Q9	IC	μPC159A	
Q10	Di, Si	1S953	
Q11	Di, Si	1S953	
Q12	IC	μPC251C	
R1	MF, 6.81kΩ, ±0.5%, 1/4W	RN14K2E6811D	
R2	MF, 110Ω, ±0.5%, 1/4W	RN14K2E1100D	
R3	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R4	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R5	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R6	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R7	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R8	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R9	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R10	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R11	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R12	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R13	CF, 4.7 to 330Ω, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1*
R14	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R15	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R16	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R17	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R18	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R19	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R20	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R21	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R22	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R23	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R24	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R25	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R26	CF, 330 to 1kΩ, ±5%, 1/4W	ARD25T*J	*
R27	CF, 1k to 2.2kΩ ±5%, 1/4W	ARD25T*J	*
R28	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R29	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R30	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R31	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R32	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R33	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R34	CF, 4.7 to 33kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 to 1*
R35	Var, MF, 100kΩ	RJ-6S 100kΩ	
R36	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R37	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R38	Var, MF, 20kΩ	RJ-6S 20kΩ	
R39	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R40	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R41	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R42	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R43	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R44	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	

Table 3–19 Z18 RETURN LOSS (CONNECT)

J1	Connector	U-SB1501	15P
J2	Connector	U-SB1501	15P

Table 3–20 DIODE ASSEMBLY FOR IF POWER HEAD

C1	Cer, 0.5p to 3 pF, ±0.25pF, 50V	RD340CK*CY50 or CC92*1H*CY	*
C2	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C3	Cer, 220pF, ±5%, 50V	RPE111CH221JY50	
Q1	Di, Si, SB	1SS78	
Q2	Di, Si, SB	1SS78	
R1	CF, 107.4Ω, ±0.5%, 1/4W	NRN1/4C4 107.4ΩD	
R2	CF, 204Ω, ±0.5%, 1/4W	NRN1/4C4 204ΩD	
R3	CF, 107.4Ω, ±0.5%, 1/4W	NRN1/4C4 107.4ΩD	
R4	CF, 75Ω, ±0.5%, 1/4W	NRN1/4C4 75ΩD	

Table 3–21 PRE AMP (I) FOR IF POWER HEAD

C1	Not assigned		
C2	Not assigned		
C3	Plast, 0.22μF, ±10%, 50V	ECQ-M05 224KZ	
C4	Cer, 0.5 to 1pF, ±0.25pF, 50V	RD340CK*CY50	Q'ty 0 or 1,*
C5	Cer, 0.5 to 1pF, ±0.25pF, 50V	RD340CK*CY50	Q'ty 0 or 1,*
C6	Not assigned		
C7	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C8	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C9	Tant, 100μF, ±20%, 3.15V	202A3151 107MY	
J1	Socket	1-332070-4	34J40917

* : Selected at factory

COMPONENT LIST OF DISPLAYING UNIT

Table 3-21. PRE AMP (I) FOR IF POWER HEAD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q1	J-FET, Nch	3SK38A	
Q2	J-FET, Nch	3SK38A	
Q3	Tr, Si, NPN	2SC1844	
Q4	Di, Si	1S953	
R1	Not assigned		
R2	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R3	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R4	CF, 33Ω, ±5%, 1/4W	ARD25T330J	
R5	Not assigned		
R6	MF, 100Ω, ±0.5%, 1/4W	RN14K2E1000D	
R7	Not assigned		
R8	MF, 900Ω, ±0.1%, 1/8W	RN05E2B9000B	
R9	MF, 115kΩ, ±0.5%, 1/4W	RN14K2E1153D	
R10	CF, 220Ω, ±5%, 1/4W	ARD25T221J	

Table 3–22 PRE AMP (II) FOR IF POWER HEAD

CKT REF	DESCRIPTION	PART NAME	NOTE
J1	Connector	R15A-17R-16PB	16P
Q1	IC	μPC254A	
R1	MF, 3.16kΩ to 3.74kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R2	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R3	MF, 3.16kΩ, ±0.5%, 1/4W	RN14K2E3161D	
R4	MF, 44.2kΩ, ±0.5%, 1/4W	RN14K2E4422D	
R5	MF, 301Ω, ±0.5%, 1/4W	RN14K2E3010D	
R6	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	

Table 3–23 PRE AMP (I) FOR RF POWER HEAD

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Not assigned		
C2	Not assigned		
C3	Plast, 2.2μF, ±10%, 100V	432A1003 225K	
C4	Cer, 0.5 to 1pF, ±0.25pF, 50V	RD340CK*CY50	Q'ty 0 or 1,*
C5	Cer, 0.5 to 1pF, ±0.25pF, 50V	RD340CK*CY50	Q'ty 0 or 1,*
C6	Not assigned		
C7	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C8	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C9	Tant, 100μF, ±20%, 3.15V	202A3151 107MY	
J1	Socket	1-332070-4	34J40917
Q1	J-FET, Nch	3SK38A	
Q2	J-FET, Nch	3SK38A	
Q3	Tr, Si, NPN	2SC1844	
Q4	Di, Si	1S953	
R1	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R2	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R3	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R4	CF, 33Ω, ±5%, 1/4W	ARD25T330J	
R5	Not assigned		
R6	MF, 30.2Ω, ±0.5%, 1/4W	RN14K2E30R2D	
R7	Not assigned		
R8	MF, 970Ω, ±0.1%, 1/8W	RN05E2B9700B	
R9	MF, 115kΩ, ±0.5%, 1/4W	RN14K2E1153D	
R10	CF, 22Ω, ±5%, 1/4W	ARD25T220J	

Table 3–24 PRE AMP (II) FOR RF POWER HEAD

CKT REF	DESCRIPTION	PART NAME	NOTE
J1	Connector	R15A-17R-16PB	16P
Q1	IC	μPC254A	
R1	MF, 3.16kΩ, ±0.5%, 1/4W	RN14K2E3161D	
R2	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R3	MF, 3.16kΩ, ±0.5%, 1/4W	RN14K2E3161D	
R4	MF, 44.2kΩ, ±0.5%, 1/4W	RN14K2E4422D	
R5	MF, 301Ω, ±0.5%, 1/4W	RN14K2E3010D	
R6	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	

* : Selected at factory

4. COMPONENT LIST OF SENDING UNIT

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 4–1 SENDING UNIT			
AT1	Att, R var, 10dB, 11P	ADR351(BNC)20S 75Ω 10dB11P	44R59906
AT2	Att, R var, 60dB, 7P	ADR351(BNC)20S 75Ω60dB7P	44R59906
C1	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	Option 001
C2	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	Option 003
C3	Cer, 68 to 470pF, ±5%, 50V	CC92CH1H*JY or RPE111CH*JY50	Option 003 Q'ty 0 or 1*
J1	Cable	Semirigid cable	Option 002
J2	Cable	WECo560~BNC-P620 or BNC-P2-NI	449J60635A
J3	Receptacle	BNC31-010 or BNC-R-NI	
J4	Receptacle	3C-R or BNC-R-N1	
J5	Cable	BNC-P620~BNC-PJ608 or BNC-P2-NI~BNC-PJ2-NI	449J66196A
J6	Cable	BNC-P620~BNC-P620 or BNC-P2-NI~BNC-P2-NI	449J57762A
J7	Socket	5X-203	
J8	Connector	PI011-6F	6P
J9	Cable	Semirigid cable	Option 002
J10	Cable	HIF3A-40D-A0-60cm	40P
J11	Connector	PI011-10F	10P
J12	Connector	PI011-13F	Option 003
J13	Cable	Semirigid cable	Option 001
J14	Cable	Semirigid cable	Option 001
J15	Cable	Semirigid cable	Option 001
J16	Cable	HRM208B~HRM208B	449J37205D
J17	Cable	HRM208B~HRM208B	449J37205C
J18	Cable	Semirigid cable	Option 003
J19	Cable	HRM202B~HRM208B	Option 003
J20	Connector	PI011-10F	10P
J21	Connector	PI011-10F	10P
J22	Connector	PI011-10F	10P
J23	Connector	PI011-5F	5P
J24	Connector	PI011-10F	Option 003
J25	Cable	HRM208B~HRM202B	Option 003
J26	Connector	PI011-2F	2P
L1	Microinductor	LF8-220k	Option 003, Q'ty 0 or 1
Q1	Tr, Si, NPN	2SD469	
Q2	Tr, Si, NPN	2SD469	Option 001
Q3	Tr, Si, NPN	2SC2199	
R1	Not assigned		
R2	CF, 75Ω, ±5%, 1/4W	ARD25T750J	Option 001
R3	CF, 75Ω, ±5%, 1/4W	ARD25T750J	Option 003
Z1	PCD, MARKER	422U8077	Table 4–2
Z2	OSC, AMP	422U8079	Table 4–3
Z3	PLL, ALC	422U8081	Table 4–4
Z4	CONTROL	422U8083	Table 4–5
Z5	COUNTER	422U8085	Table 4–6
Z6	MOTHER BOARD	422U8087	Table 4–7
Z7	SWITCH BOARD	432U23183	Table 4–8
Z8	FRONT BOARD	432U23185	Table 4–9
Z9	MARKER DELAY	432U23187	Table 4–10
Z10	COUNTER INPUT	442U63466	Table 4–11
Z11	COUNTER DISPLAY	442U63468	Table 4–12
Z12	DIGITAL SWITCH BOARD	442U62970	Table 4–13
Z13	CRYSTAL OSC	TCO-612C	
Z14	IF MISMATCH	20dB IF MISMATCH	
Z15	Not assigned		
Z16	11GHzYTO	439H19813 F	Option 001
Z17	COAXIAL ISOLATOR	44Z25605X	Option 001
Z18	PIN MODULATOR	439H17504A	Option 001
Z19	LPF	439H19392D	Option 001
Z20	4/6GHz YTO	439H19810D or 439H23825A	
Z21	4/6GHz RF CIRCUIT	429H8323	
Z22	VCO	44Y62649	Table 3.4-14
Z23	Not assigned		
Z24	RF SWITCH	439H21571	Option 003
Z25	RF SWITCH	439H22673	
Z26	4/6GHz AMP	429H8426	
Z27	SPLITTER DETECTOR	429H8576	Option 002
Z28	MIXER	429H8575	Option 002
Z29	2GHz YTO	439H23825B	Option 003
Z30	2GHz AMP	429H8817	Option 003
Z31	COUPLER	439H25176	Option 003
Z32	PIN MODULATOR	439H17504A	Option 003
Z33	LPF	439H25177	Option 003

CKT REF	DESCRIPTION	PART NAME	NOTE
Table 4–2 Z1 PCD AND MARKER			
C1	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C2	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C3	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C4	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C5	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C6	Elect, 22μF, 16V	KX16T-22	
C7	Cer, 0 to 10pF, ±0.5pF, 50V	CC92CH1H * DY	
C8	Cer, 470pF, ±5%, 50V	RD314CH471JY50	
C9	Elect, 22μF, 16V	KX16T-22	
C10	Elect, 22μF, 16V	KX16T-22	
C11	Tant, 330μF, ±20%, 6.3V	CS02H0J331M	
C12	Elect, 22μF, 25V	KX25T-22	
C13	Elect, 22μF, 10V	KX10T-22	
C14	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C15	Not assigned		
C16	Not assigned		
C17	Cer, 220pF, ±5%, 50V	CC92SL1H 221JY	
C18	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C19	Elect, 4.7μF, 50V	KX50T-4.7	
C20	Not assigned		
C21	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C22	Cer, 220pF, ±5%, 50V	CC92SL1H221JY	
C23	Not assigned		
C24	Elect, 47μF, 16V	KX16T-47	
C25	Elect, 47μF, 16V	KX16T-47	
C26	M Plast, 0.47μF, ±10%, 100V	FNX-HS 1003-474-K	
C27	Cer, 470pF, ±5%, 50V	RD312SL 471JY50	
C28	Not assigned		
C29	Elect, 47μF, 10V	KX10T-47	
C30	Not assigned		
C31	Not assigned		
C32	Elect, 100μF, 10V	KX10T-100μF	
C33	Elect, 100μF, 10V	KX10T-100μF	
C34	Elect, 10μF, 25V	KX25T-10μF	
C35	Elect, 10μF, 25V	KX25T-10μF	
C36	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C37	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C38	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C39	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C40	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C41	Cer, 100pF, ±5%, 50V	CC92SL1H101JY	
C42	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C43	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C44	Not assigned		
C45	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C46	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C47	Cer, 15pF, ±0.5pF, 50V	CC92CH1H150JY	
C48	Cer, 100pF, ±5%, 50V	CC92SL1H101JY	
C49	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C50	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C51	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C52	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C53	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C54	Cer, 2200pF, ±20%, 50V	CK45D1H222MY	
C55	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C56	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C57	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C58	Cer, 47pF, ±5%, 50V	CC92CH1H470JY	
C59	Cer, 10pF, ±0.5pF, 50V	CC92CH1H100DY	
C60	Cer, 6pF, ±0.5pF, 50V	CC92CH1H060DY	
C61	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C62	Not assigned		
C63	Cer, 100pF, ±5%, 50V	CC92SL1H101JY	
C64	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C65	Cer, 15pF, ±5%, 50V	CC92CH1H150JY	
C66	Cer, 100pF, ±5%, 50V	CC92SL1H101JY	
C67	Elect, 10μF, 25V	KX25T-10μF	
C68	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C69	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C70	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C71	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C72	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C73	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C74	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C75	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-2. Z1 PCD AND MARKER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
C76	Cer, 3pF, ±0.25pF, 50V	CC92CJ1H030CY	
C77	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C78	Cer, 1pF, ±0.25pF, 50V	RD340CK010CY50	Q'ty 0 or 1*
C79	Cer, 1pF, ±0.25pF, 50V	RD340CK010CY50	Q'ty 0 or 1*
C80	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C81	Not assigned		
C82	Not assigned		
C83	Tant, 330μF, ±20%, 6.3V	CS02H0J331M	
C84	Tant, 330μF, ±20%, 6.3V	CS02H0J331M	
C85	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C86	Not assigned		
C87	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C88	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C89	Cer, 8pF, ±0.5pF, 50V	CC92CH1H080DY	
C90	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C91	Cer, 8pF, ±0.5pF, 50V	CC92CH1H080DY	
C92	Not assigned		
C93	Not assigned		
C94	Elect, 22μF, 16V	KX16T-22μF	
C95	Elect, 22μF, 16V	KX16T-22μF	
C96	Elect, 22μF, 16V	KX16T-22μF	
C97	Elect, 22μF, 16V	KX16T-22μF	
C98	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C99	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C100	Not assigned		
C101	Not assigned		
C102	Not assigned		
K1	Reed relay	REA4	
K2	Reed relay	REA4	
K3	Reed relay	REA4	
K4	Reed relay	REA4	
K5	Reed relay	REA4	
K6	Reed relay	REA4	
J1	Plug	27DP-LP-1.5	
L1	Not assigned		
L2	Coil	44L65882B	
L3	Coil, 3.3mH	FS1012-332K	
L4	Coil	44L65882B	
L5	Coil	442L45322A	
L6	Coil	44L65882B	
L7	Coil	44L65882B	
L8	Coil	442L45322A	
L9	Not assigned		
L10	Not assigned		
L11	Coil, 0.22μH	SP0408-R22K	
L12	Coil, 0.22μH	SP0408-R22K	
L13	Coil, 0.68μH	SP0408-R68K	
L14	Coil, 100μH	LF8-101K	
L15	Coil, 100μH	LF8-101K	
L16	Coil, 10μH	LF8-100K	
L17	Coil	44L65882B	
L18	Coil	44L65882B	
Q1	IC	MC5157	
Q2	Tr, Si, NPN	2SC2368	
Q3	IC	HD10231	
Q4	IC	HD10125	
Q5	IC	74LS90	
Q6	IC	74LS90	
Q7	IC	74121	
Q8	Tr, Si, NPN	2SC2368	
Q9	Tr, Si, PNP	2SA711	
Q10	Tr, Si, PNP	2SA711	
Q11	IC	μPC258C	
Q12	Di, breakdown, 5.9V to 6.5V, 250mW	1SZ51	
Q13	Di, breakdown, 5.9V to 6.5V, 250mW	1SZ51	
Q14	Tr, Si, PNP	2SA711	
Q15	IC	μPC55A	
Q16	Di, breakdown, 3.7 to 4.1V, 400mW	RD3.9EB	
Q17	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q18	IC	74LS00	
Q19	IC	74121	
Q20	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	

CKT REF	DESCRIPTION	PART NAME	NOTE
Q21	IC	74LS74A	
Q22	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q23	IC	TC4066P	
Q24	IC	FS-7805L	
Q25	Di, Si	1S953	
Q26	IC	μPC151C	
Q27	IC	μPC251C	
Q28	Tr, Si, NPN	2SC1044	
Q29	Tr, Si, NPN	2SC1044	
Q30	Tr, Si, NPN	2SC1044	
Q31	Tr, Si, NPN	2SC1044	
Q32	Di, Si	1S2222	
Q33	Di, Si	1S2222	
Q34	Tr, Si, NPN	2SC2368	
Q35	Tr, Si, NPN	2SC1834	
Q36	Tr, Si, NPN	2SC1253	
Q37	Di, Si	1SS97	
Q38	Di, Si	1SS97	
Q39	Di, Si	1SS97	
Q40	Di, Si	1SS97	
Q41	Di, Si	1S2222	
Q42	IC	μPC159A	
Q43	Not assigned		
Q44	Not assigned		
Q45	Not assigned		
Q46	Di, Si	1S2222	
Q47	Not assigned		
Q48	Not assigned		
Q49	Not assigned		
Q50	Not assigned		
Q51	Not assigned		
Q52	Not assigned		
Q53	IC	μPC251C	
Q54	Di, Si	1S953	
Q55	Di, Si	1S953	
Q56	IC	μPC151C	
Q57	IC	μPC157C	
Q58	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q59	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q60	IC	μPC157C	
Q61	IC	74LS00	
Q62	IC	74S04	
Q63	Di, Si	1S953	
Q64	Not assigned		
Q65	Di, Si	1S953	
Q66	Di, Si	1S953	
Q67	Not assigned		
Q68	Di, Si	1SS16	
Q69	Di, Si	1SS16	
Q70	Tr, Si, NPN	2SC1833	
Q71	Not assigned		
Q72	IC	74LS00	
Q73	IC	7407	
Q74	Di, Si	1S953	
Q75	Di, breakdown, 8.45 to 9.45V, 400mW	RD9.1EB	
Q76	Di, breakdown, 8.45 to 9.45V, 400mW	RD9.1EB	
Q77	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q78	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q79	Di, breakdown, 4.95 to 5.25V, 400mW	RD5.1E(3)	
R1	CF, 10Ω, ±5%, 1/4W	ARD25T100J	
R2	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R3	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R4	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R5	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R6	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R7	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R8	MF, 5.11kΩ, ±0.5%, 1/4W	RN14K2E5111D	
R9	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R10	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R11	MF, 2.21kΩ, ±0.5%, 1/4W	RN14K2E2211D	
R12	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R13	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R14	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R15	MF, 1.54kΩ, ±0.5%, 1/4W	RN14K2E1541D	
R16	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R17	Var, MF, 20kΩ	RJ-6P 20kΩ	
R18	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R19	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R20	CF, 12kΩ, ±5%, 1/4W	ARD25T123J	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-2. Z1 PCD AND MARKER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R21	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R22	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R23	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R24	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R25	MF, 1.54kΩ, ±0.5%, 1/4W	RN14K2E1541D	
R26	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R27	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R28	Var, MF, 1kΩ	RJ-6P 1kΩ	
R29	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R30	MF, 100kΩ, ±0.5%, 1/4W	RN14K2E1003D	
R31	Var, MF, 100kΩ	RJ-6P 100kΩ	
R32	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R33	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R34	CF, 330kΩ, ±5%, 1/4W	ARD25T334J	
R35	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R36	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R37	Not assigned		
R38	Not assigned		
R39	Not assigned		
R40	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R41	CF, 330kΩ, ±5%, 1/4W	ARD25T331J	
R42	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	
R43	Not assigned		
R44	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R45	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R46	Not assigned		
R47	Not assigned		
R48	Not assigned		
R49	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R50	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R51	Var, MF, 1kΩ	RJ-6P 1kΩ	
R52	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R53	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R54	Not assigned		
R55	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R56	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R57	CF, 100k to 1MΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1,*
R58	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R59	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R60	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R61	CF, 4.7Ω, ±5%, 1/4W	ARD25T4R7J	
R62	MF, 1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R63	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R64	Not assigned		
R65	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R66	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R67	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R68	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R69	CF, 2.2k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R70	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R71	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R72	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R73	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R74	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R75	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R76	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R77	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R78	CF, 2.2k to 10kΩ, ±5%, 1/4W	ARD25T*J	*
R79	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R80	Not assigned		
R81	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R82	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R83	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R84	Not assigned		
R85	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R86	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R87	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R88	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R89	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R90	Not assigned		
R91	Not assigned		
R92	Not assigned		
R93	Not assigned		
R94	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R95	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R96	CF, 10Ω, ±5%, 1/4W	ARD25T100J	Q'ty 0 or 1,*
R97	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R98	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R99	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R100	Not assigned		

CKT REF	DESCRIPTION	PART NAME	NOTE
R101	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R102	CF, 10Ω, ±5%, 1/4W	ARD25T100J	
R103	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R104	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R105	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R106	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R107	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R108	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R109	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R110	Not assigned		
R111	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R112	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R113	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R114	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R115	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R116	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R117	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R118	Not assigned		
R119	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R120	Not assigned		
R121	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R122	Not assigned		
R123	Not assigned		
R124	Not assigned		
R125	Not assigned		
R126	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R127	Not assigned		
R128	Not assigned		
R129	Not assigned		
R130	Not assigned		
R131	Not assigned		
R132	Not assigned		
R133	Not assigned		
R134	Not assigned		
R135	Not assigned		
R136	Not assigned		
R137	Not assigned		
R138	Not assigned		
R139	Not assigned		
R140	Var, MF, 1kΩ	RJ-6S 1kΩ	
R141	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R142	MF, 9.09kΩ, ±0.5%, 1/4W	RN14K2E9091D	
R143	Var, MF, 2kΩ	RJ-6P 2kΩ	
R144	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R145	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R146	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R147	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R148	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R149	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R150	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R151	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R152	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R153	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R154	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R155	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R156	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R157	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R158	Not assigned		
R159	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R160	Not assigned		
R161	CF, 270Ω, ±5%, 1/4W	ARD25T271J	
R162	CF, 270Ω, ±5%, 1/4W	ARD25T271J	
R163	Var, MF, 20kΩ	RJ-6P 20kΩ	
R164	CF, 470kΩ, ±5%, 1/4W	ARD25T474J	
R165	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R166	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R167	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R168	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R169	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R170	Not assigned		
R171	Not assigned		
R172	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R173	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R174	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R175	Not assigned		
R176	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R177	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R178	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R179	CF, 270Ω, ±5%, 1/4W	ARD25T271J	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-2. Z1 PCD AND MARKER (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
X1	XTAL Unit, 70MHz	44X64361A	
X2	XTAL Unit, 74.1MHz	44X64361B	
X3	XTAL Unit, 70.3MHz	44X64361C	
X4	XTAL Unit, 74.4MHz	44X64361D	
X5	XTAL Unit, 69.7MHz	44X64361E	
X6	XTAL Unit, 73.8MHz	44X64361F	
Z1	Mixer	SBL-1	

Table 4–3 Z2 IF OSC AND AMP

C1	Tant, 1μF, ±20%, 35V	CS02H1V010M	
C2	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C3	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C4	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C5	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C6	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C7	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C8	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C9	Plast, 0.047μF, ±10%, 50V	ECQ-M05 472KZ	
C10	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C11	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C12	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C13	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C14	Cer, 6pF, ±0.5pF, 50V	CC92CH1H060DY	
C15	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C16	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C17	Cer, 1pF, ±0.25pF, 50V	RD340CK010CY50	
C18	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C19	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C20	Cer, 47pF, ±5%, 50V	CC92CH1H470JY	
C21	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C22	Not assigned		
C23	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C24	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C25	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C26	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C27	Cer, 4700pF, ±20%, 50V	RPD670C472M50V	
C28	Not assigned		
C29	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C30	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C31	Cer, 470pF, ±20%, 50V	RPE111CH471JY50	
C32	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C33	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C34	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C35	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C36	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C37	Cer, 100pF, ±5%, 50V	CC92CH1H101JY	
C38	Plast, 0.1μF, ±1%, 50V	ECQ-P1104FZ	
C39	Plast, 0.1μF, ±1%, 50V	ECQ-P1104FZ	
C40	Not assigned		
C41	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C42	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C43	Elect, 220μF, 10V	KX10T-220μF	
C44	M plast, 1μF, ±10%, 100V	FNX-HS1003-105-K	
C45	Cer, 1000pF, ±20%, 50V	CK45D1H 102MY	
C46	Elect, 22μF, 16V	KX16T-22μF	
C47	Elect, 22μF, 16V	KX16T-22μF	
C48	Cer, 1000pF, ±20%, 50V	CK45D1H 102MY	
C49	Not assigned		
C50	Not assigned		
C51	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C52	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C53	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C54	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C55	Elect, 22μF, 16V	KX16T-22	
C56	Elect, 22μF, 16V	KX16T-22	
C57	Elect, 22μF, 16V	KX16T-22	
C58	Elect, 22μF, 16V	KX16T-22	
C59	Cer, 7 to 22pF, ±5%, 50V	CC92CH1H*JY1	*
C60	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C61	Cer, 22pF, ±5%, 50V	CC92CH1H220JY	
C62	Cer, 6 to 15pF, ±0.5pF, 50V	CC92CH1H*DY	*
C63	Cer, 10pF, ±0.5pF, 50V	CC92CH1H100DY	
C64	Cer, 330pF, ±5%, 50V	CC92SL1H331JY	
C65	Cer, 470pF, ±5%, 50V	RD312SL471JY50	
C66	Cer, 6pF, ±0.5pF, 50V	CC92CH1H060DY	
C67	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C68	Not assigned		
C69	Not assigned		
C70	Not assigned		
C71	Not assigned		
C72	Not assigned		
C73	Cer, 33pF, ±5%, 50V	CC92CH1H330JY	
C74	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C75	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C76	Tant, 4.7μF, ±20%, 35V	CS02H1V4R7M	
C77	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C78	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C79	Not assigned		
C80	Not assigned		
C81	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C82	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C83	Cer, 47pF, ±5%, 50V	CC92CH1H470JY	
C84	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C85	M plast, 0.47μF, ±10%, 100V	FNX-HS1003-474-K	
C86	Elect, 22μF, 25V	KX25T-22μF	
C87	Elect, 22μF, 10V	KX10T-22μF	
C88	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
J1	Plug	BNC-P620 or BNC-P-NI	
J2	Receptacle	3C-R or BNC-R-NI	
J3	Receptacle	27DP-R-PC-1	
K1	Relay	NF4-DC24V	
K2	Relay	MT03A	
L1	Oscillation coil	44T40049B	
L2	Coil, 0.22μH	SP0408-R22K	
L3	Coil, 3.3μH	SP0408-3R3K	
L4	Coil	44T40049E	
L5	Coil	44T40049D	
L6	Coil	44T40049C	
L7	Microinductor, 100μH	LF8-101K	
L8	Microinductor, 100μH	LF8-101K	
L9	Microinductor, 0.1μH	SP0408-R10M	
L10	Microinductor, 3.3mH	LH1-332K	
L11	Microinductor, 3.3mH	LH1-332K	
L1	Microinductor, 100μH	LF8-101K	
Q1	Tr, Si, NPN	2SC2368	
Q2	Tr, Si, NPN	2SC1253	
Q3	Not assigned		
Q4	Not assigned		
Q5	IC	MC5156	
Q6	IC	MC5156	
Q7	Tr, Si, NPN	2SC1253	
Q8	Tr, Si, NPN	2SC1253	
Q9	IC	μPC157C	
Q10	Not assigned		
Q11	Tr, Si, NPN	2SC1253	
Q12	Di, varicap	FC53	
Q13	Di, varicap	FC53	
Q14	IC	μPC251C	
Q15	IC	μPC251C	
Q16	Not assigned		
Q17	IC	μPC251C	
Q18	IC	μPC151C	
Q19	Not assigned		
Q20	Di, varicap	FC53	
Q21	Di, varicap	FC53	
Q22	Di, varicap	FC53	
Q23	Di, varicap	FC53	
Q24	Di, Si	1S2210	
Q25	Di, Si	1S2210	
Q26	Di, Si	1S2210	
Q27	Di, Si	1S953	
Q28	Di, breakdown, 3.7 to 4.1V, 400mW	RD3.9EB	
Q29	Di, breakdown, 3.7 to 4.1V, 400mW	RD3.9EB	
Q30	Not assigned		

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-3. Z2 IF OSC AND AMP (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q31	Photocoupler	P873-G35-380	
Q32	Di, Si	1S953	
Q33	Di, Si	1S953	
Q34	Di, Si	1S953	
Q35	Di, breakdown, 5.9V to 6.5V, 250mW	1SZ51	
Q36	Di, Si	1S2222	
Q37	Di, Si	1S2222	
Q38	Di, Si	1S2222	
Q39	Di, PIN	5082-3379	
Q40	Di, varicap	FC51	
Q41	Di, Si	1S953	
Q42	Di, Si	1S953	
Q43	Di, varicap	FC51	
Q44	Di, varicap	FC51	
Q45	Di, varicap	FC51	
Q46	Di, varicap	FC51	
Q47	Di, Si	1S953	
Q48	Di, Si	1S953	
Q49	Di, Si	1S2222	
Q50	Di, Si	1S2222	
Q51	Di, Si	1S2222	
Q52	IC	μPC251C	
Q53	Di, breakdown, 4.95 to 5.25V, 400mW	RD5.1E(3)	
Q54	Di, breakdown, 4.95 to 5.25V, 400mW	RD5.1E(3)	
Q55	Di, Si	1S953	
Q56	Di, Si	1S953	
Q57	Di, Si	1S2222	
R1	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R2	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R3	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R4	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R5	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R6	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R7	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R8	MF, 470Ω, ±5%, 1/2W	RN14K2H471J	
R9	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R10	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R11	Not assigned		
R12	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R13	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R14	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R15	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R16	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R17	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R18	Not assigned		
R19	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R20	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R21	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R22	Not assigned		
R23	MF, 150Ω, ±5%, 1W	RS1FB150ΩJ	
R24	CF, 270Ω, ±5%, 1/4W	ARD25T271J	
R25	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R26	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R27	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R28	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R29	MF, 220Ω, ±5%, 1W	RS1FB220ΩJ	
R30	MF, 220Ω, ±5%, 1W	RS1FB220ΩJ	
R31	MF, 75.0Ω, ±0.5%, 1/4W	NRN1/4C4 75.0ΩD	
R32	Not assigned		
R33	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R34	CF, 33Ω, ±5%, 1/4W	ARD25T330J	
R35	MF, 120Ω, ±5%, 1/4W	NRTF1/4C120ΩJ	
R36	CF, 75Ω, ±5%, 1/4W	ARD25T750J	
R37	Not assigned		
R38	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R39	CF, 270Ω, ±5%, 1/4W	ARD25T271J	
R40	CF, 110Ω, ±5%, 1/4W	ARD25T111J	
R41	CF, 150Ω, ± 5%, 1/4W	ARD25T151J	
R42	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R43	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R44	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R45	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R46	MF, 22.1kΩ, ±0.5%, 1/4W	RN14K2E2212D	
R47	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R48	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R49	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R50	CF, 470Ω, ±5%, 1/4W	ARD25T471J	

CKT REF	DESCRIPTION	PART NAME	NOTE
R51	MF, 19.1kΩ, ±0.5%, 1/4W	RN14K2E1912D	
R52	MF, 15.4kΩ, ±0.5%, 1/4W	RN14K2E1542D	
R53	MF, 19.1kΩ, ±0.5%, 1/4W	RN14K2E1912D	
R54	MF, 15.4kΩ, ±0.5%, 1/4W	RN14K2E1542D	
R55	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R56	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R57	CF, 20kΩ, ±5%, 1/4W	ARD25T203J	
R58	CF, 12kΩ, ±5%, 1/4W	ARD25T123J	
R59	Not assigned		
R60	Not assigned		
R61	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R62	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R63	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R64	CF, 110Ω, ±5%, 1/4W	ARD25T111J	
R65	CF, 680kΩ, ±5%, 1/4W	ARD25T684J	
R66	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R67	CF, 10 to 680kΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1,*
R68	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R69	Not assigned		
R70	Not assigned		
R71	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R72	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R73	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R74	Not assigned		
R75	Var, MF, 100kΩ	RJ-6S 100kΩ	
R76	Not assigned		
R77	CF, 330kΩ, ±5%, 1/4W	ARD25T334J	
R78	CF, 8.2kΩ, ±5%, 1/4W	ARD25T822J	
R79	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R80	Not assigned		
R81	Var, MF, 10kΩ	RJ-6P 10kΩ	
R82	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R83 to R93	Not assigned		
R94	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R95	Not assigned		
R96	Not assigned		
R97	Var, MF, 50kΩ	RJ-6S 50kΩ	
R98	Var, MF, 10kΩ	RJ-6S 10kΩ	
R99	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R100	Not assigned		
R101	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	Q'ty 2
R102	CF, 4.7Ω to 100kΩ, ±5%, 1/4W	ARD25T*J	*
R103	CF, 1k to 100kΩ, ±5%, 1/4W	ARD25T*J	*
R104	Not assigned		
R105	Not assigned		
R106	Not assigned		
R107	CF, 100k to 1MΩ, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1, *
R108	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R109	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R110	Not assigned		
R111	CF, 470kΩ, ±5%, 1/4W	ARD25T474J	
R112	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R113	CF, 33Ω, ±5%, 1/4W	ARD25T330J	
R114	Not assigned		
R115	Not assigned		
R116	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R117	CF, 150kΩ, ±5%, 1/4W	ARD25T154J	
R118	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R119	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R120	Not assigned		
R121	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R122	CF, 150kΩ, ±5%, 1/4W	ARD25T154J	
R123	CF, 150kΩ, ±5%, 1/4W	ARD25T154J	
R124	Not assigned		
R125	Not assigned		
R126	Not assigned		
R127	Var, MF, 10kΩ	RJ-6S 10kΩ	
R128	CF, 150Ω, ±5%, 1/4W	ARD25T151J	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4–4 Z3 PLL, ALC BOARD

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Not assigned		
C2	Not assigned		
C3	Not assigned		
C4	Not assigned		
C5	Not assigned		
C6	Not assigned		
C7	Cer, 1pF, ±0.25pF, 50V	RD340CK010CY50	
C8	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C9	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C10	Not assigned		
C11	Not assigned		
C12	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C13	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C14	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C15	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C16	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C17	Cer, 100pF, ±5%, 50V	CC92CH1H101J	
C18	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C19	Not assigned		
C20	Not assigned		
C21	Not assigned		
C22	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C23	Not assigned		
C24	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
C25	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C26	Plast, 4700pF, ±10%, 50V	ECQ-M05 472KZ	
C27	Not assigned		
C28	Not assigned		
C29	Plast, 1000pF, ±10%, 50V	ECQ-M05 102KZ	
C30	Plast, 0.47μF, ±10%, 50V	ECQ M1H 474KZ	Q'ty 2
C31	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	Option 001
C32	Tant, 4.7μF, ±20%, 10V	CS02H1A4R7M	
C33	Elect, 33μF, ±20%, 16V	KX16VB-33	Q'ty 0 or 1,*
C34	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C35	Not assigned		
C36	Not assigned		
C37	Not assigned		
C38	Not assigned		
C39	Not assigned		
C40	Not assigned		
C41	Elect, 33μF, +20%, 16V	KX16VB-33	
C42	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C43	Elect, 33μF, ±20%, 16V	KX16VB-33	
C44	Elect, 33μF, ±20%, 16V	KX16VB-33	
C45	Elect, 33μF, ±20%, 16V	KX16VB-33	
C46	Not assigned		
C47	Elect, 33μF, ±20%, 16V	KX16VB-33	
C48	Elect, 33μF, ±20%, 16V	KX16VB-33	
C49	Not assigned		
C50	Elect, 220μF, 10V	KX10T-220	
C51	Not assigned		
C52	Not assigned		
C53	Not assigned		
C54	Tant, 2.2μF, ±20%, 20V	CS02H1D2R2M	Option 001
C55	Not assigned		
C56	Not assigned		
C57	Elect, 2.2μF, ±20%, 63V	KX63VB2.2	Option 003
C58	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	Option 003
C59	Elect, 2.2μF, ±20%, 50V	KX63VB-2.2	
C60	Plast, 0.022μF, +10%, 50V	ECQ-M05 223KZ	
C61	Elect, 2.2μF, ±20%, 63V	KX63VB-2.2	
C62	Plast, 0.022μF, ±10%, 50V	ECQ-M05 223KZ	
C63	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C64	Elect, 33μF, ±20%, 16V	KX16VB-33	
C65	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C66	Elect, 10μF, ±20%, 50V	KX50VB-10	
C67	Cer, 1pF~5pF, +0.5pF, 50V	CC92CH1H*DY	*
C68	Cer, 150pF, ±5%, 50V	RD312CH151JY50	
C69	Cer, 150pF, ±5%, 50V	RD312CH151JY50	
C70	Cer, 150pF, ±5%, 50V	RD312CH151JY50	
C71	Plast, 0.001μ to 0.022μF, ±10%, 50V	ECQ-M05*KZ	Q'ty 0 or 1,*
C72	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C73	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C74	Cer, 220 to 1000pF, ±5%, 50V or	RPE111CH*JY50	
C75	Plast, 0.001~0.0022μF, ±10%, 50V	or ECQ-M05*KZ	*
	Plast, 0.001~0.01μF, ±10%, 50V	ECQ-M05 *KZ	*

CKT REF	DESCRIPTION	PART NAME	NOTE
C76	Not assigned		
C77	Not assigned		
C78	Not assigned		
C79	Cer, 2pF, ±0.25pF, 50V	CC92CK1H020CY	
C80	Not assigned		
C81	Cer, 5pF, ±0.5pF, 50V	CC92CH1H050DY	Q'ty 0 or 1,*
C82	Cer, 10pF~100pF, ±5%, 50V	CC92CH1H *JY	"
C83	Cer, 5pF, ±0.5pF, 50V	CC92CH1H050DY	
C84	Not assigned		
C85	Not assigned		
C86	Cer, 68pF, ±5%, 50V	CC92CH1H680JY	
C87	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C88	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C89	Elect, 10μF, ±20%, 50V	KX50VB-10	
C90	Elect, 33μF, ±20%, 50V	KX16VB-33	
C91	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C92	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C93	Plast, 0.001μF to 0.0022μF, ±10%, 50V	ECQ-M05 * KZ	Q'ty 0 or 1*
C94	Elect, 33μF, ±20%, 16V	KX16VB-33	
C95	Elect, 2.2μF, ±20%, 63V	KX63VB-2.2	
C96	Cer, 22pF, ±5%, 50V	CC92CH1H220Y	
C97	Cer, 68pF, ±5%, 50V	CC92CH1H680JY	
C98	Not assigned		
C99	Not assigned		
C100	Not assigned		
C101	Not assigned		
C102	Not assigned		
C103	Not assigned		
C104	Not assigned		
C105	Elect, 33μF, ±20%, 16V	KX16VB-33	
C106	Elect, 220μF, ±20%, 16V	KX16T-220	
J1	Connector	PI011-2M	2P
J2	Connector	PI011-10M	10P
J3	Connector	PI011-13M	Option 003, 13P
K1	Reed relay	RR4113 or MT03A	
K2	Reed relay	MT03A	
K3	Relay	NF4-12V	Option 001
K4	Reed relay	NR-HD-12V	Option 001
K5	Reed relay	NR-HD-12V	Option 001
K6	Relay	NF2-12V	Option 001
K7	Not assigned		
K8	Relay	NF4-12V	Option 03
K9	Reed relay	NR-HD-12V	Option 03
K10	Relay	NF4-12V	Option 03
L1	Coil, 50μH, 2A	SF-T8-50D	
L2	Microinductor	LH1-332K	
Q1	Not assigned		
Q2	Tr, Si, NPN	2SC2148	
Q3	Tr, Si, NPN	2SC2148	
Q4	Di, Si	1S2222	
Q5	Di, Si	1S2222	
Q6	Di, Si	1S2222	
Q7	IC	TC4053BP	
Q8	Not assigned		
Q9	IC	μPC151C	
Q10	Di, Si	1S953	
Q11	Tr, Si, NPN	2SC1833	
Q12	Tr, Si, NPN	2SC1833	
Q13	Tr, Si, NPN	2SC1833	
Q14	IC	μPC151C	
Q15	Not assigned		
Q16	IC	μPC151C	
Q17	Di, Si	1S953	Option 001
Q18	IC	7407	
Q19	Di, Si	1S953	
Q20	Tr, Si, NPN	2SC1833	
Q21	Rectifier	V03C	Option 001, 003
Q22	Rectifier	V03C	Option 001
Q23	Rectfier	V03C	Option 003
Q24	IC	μPC152A	
Q25	Tr, Si, NPN	2SC1044	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-4. Z3 PLL, ALC BOARD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
Q26	Tr, Si, NPN	2SC1044	
Q27	Tr, Si, NPN	2SC1833	
Q28	IC	74LS86	
Q29	Di, Si	1S953	Option 003
Q30	Di, breakdown, 4.7 to 5.1V, 400mW	RD5.1EB	Option 001
Q31	Di, breakdown, 4.7 to 5.1V, 400mW	RD5.1EB	
Q32	IC	μPC151C	
Q33	Tr, Si, PNP	2SA883	Option 001
Q34	Tr, Si, NPN	2SC1833	
Q35	Tr, Si, PNP	2SA883	
Q36	Tr, Si, PNP	2SA606 Ⓢ	
Q37	Tr, Si, NPN	2SC959 Ⓢ	
Q38	Di, Si	1S955	
Q39	Di, Si	1S955	
Q40	Di, Si	1S953	
Q41	Di, Si	1S953	
Q42	Tr, Si, PNP	2SA883	
Q43	IC	μPC151C	
Q44	Di, Si	1S953	
Q45	Not assigned		
Q46	IC	μPC157C	
Q47	IC	μPC157C	
Q48	Di, Si	1S953	
Q49	Di, Si	1S953	
Q50	Di, breakdown, 4.7 to 5.1V, 400mW	RD5.1EB	
Q51	Tr, Si, NPN	2SC1833	
Q52	IC	μPC157C	
Q53	Di, Si	1S953	
Q54	Di, Si	1S953	
Q55	Tr, Si, NPN	2SC1833	
Q56	Tr, Si, PNP	2SA883	
Q57	Di, Si	1S953	
Q58	Tr, Si, NPN	2SC1833	
Q59	Tr, Si, NPN	2SC1833	
Q60	Tr, Si, NPN	2SC1833	
Q61	Tr, Si, NPN	2SC1833	
Q62	Tr, Si, NPN	2SC1833	
Q63	Tr, Si, NPN	2SC1833	
Q64	Tr, Si, NPN	2SC1833	
Q65	Di, Si	1S953	
Q66	IC	μPC157C	
Q67	IC	TC4053BP	
Q68	Di, Si	1S953	Option 001
Q69	Di, Si	1S953	Option 003
Q70	Di, Si	1S953	
Q71	Di, Si	1S953	Option 001
Q72	Di, Si	1S953	Option 003
Q73	Di, breakdown, 8.5 to 9.6V, 400mW	RD9.1EB	
Q74	Di, breakdown, 5.9 to 6.5V, 400mW	1SZ51	
Q75	IC	μPC251C	
Q76	Tr, Si, PNP	2SA883	
Q77	Tr, Si, NPN	2SC1833	
Q78	Not assigned		
Q79	Tr, Si, NPN	2SC1833	Option 003
Q80	Tr, Si, PNP	2SA883	Option 003
Q81	Tr, Si, PNP	2SA606 Ⓢ	Option 003
Q82	Tr, Si, NPN	2SC959 Ⓢ	Option 003
Q83	Di, Si	1S955	Option 003
Q84	Di, Si	1S955	Option 003
Q85	IC	74LS00	
Q86	Tr, Si, NPN	2SC1833	
Q87	Tr, Si, PNP	2SA883	
Q88	Tr, Si, PNP	2SA606 Ⓢ	
Q89	Tr, Si, NPN	2SC959 Ⓢ	
Q90	Di, Si	1S955	
Q91	Di, Si	1S955	
Q92	Not assigned		
Q93	Di, breakdown, 5.9 to 6.5V, 400mW	RD6.2EB(3)	
Q94	Di, breakdown, 5.9 to 6.5V, 400mW	RD6.2EB(3)	
R1	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R2	CF, 150Ω, ±5%, 1/4W	ARD25T151J	
R3	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R4	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R5	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R6	CF, 10Ω, ±5%, 1/4W	ARD25T100J	
R7	CF, 150Ω, ±5%, 1/4W	ARD25T151J	
R8	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R9	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R10	Not assigned		

CKT REF	DESCRIPTION	PART NAME	NOTE
R11	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R12	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R13	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R14	CF, 51Ω, ±5%, 1/4W	ARD25T510J	
R15	Not assigned		
R16	Not assigned		
R17	Not assigned		
R18	Not assigned		
R19	Not assigned		
R20	Not assigned		
R21	Not assigned		
R22	Not assigned		
R23	Not assigned		
R24	CF, 51Ω, ±5%, 1/4W	ARD25T510J	
R25	Not assigned		
R26	Not assigned		
R27	Not assigned		
R28	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R29	CF, 220kΩ, ±5%, 1/4W	ARD25T224J	
R30	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R33	MF, 24.9kΩ, ±0.5%, 1/4W	RN14K2E2492D	
R34	CF, 270Ω~330Ω, ±5%, 1/4W	ARD25T*J	
R35	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R36	CF, 680Ω to 3.3kΩ, ±5%, 1/4W		
R37	Not assigned		
R38	Not assigned		
R39	Not assigned		
R40	Not assigned		
R41	Not assigned		
R42	Not assigned		
R43	Not assigned		
R44	Not assigned		
R45	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R46	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R47	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R48	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R49	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R50	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R51	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	Q'ty 0 or 1.*
R52	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R53	Not assigned		
R54	Var, MF, 500Ω	RJ-6S 500Ω	
R55	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R56	MF, 4.64kΩ, ±0.5%, 1/4W	RN14K2E4641D	
R57	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R58	CF, 10Ω~100Ω, ±5%, 1/4W	ARD25T*J	Q'ty 0 or 1.*
R59	WW, 10Ω, ±5%, 5W	WR-510ΩJ	Q'ty 2
R60	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R61	Not assigned		
R62	Not assigned		
R63	Not assigned		
R64	Not assigned		
R65	Not assigned		
R66	Not assigned		
R67	Not assigned		
R68	Not assigned		
R69	Not assigned		
R70	Not assigned		
R71	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R72	CF, 10 to 220Ω, ±5%, 1/4W	ARD25T*J	*
R73	Not assigned		
R74	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R75	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R76	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R77	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R78	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R79	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R80	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R81	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R82	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R83	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R84	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R85	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R86	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R87	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R88	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	Option 003
R89	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	Option 003
R90	CF, 100Ω, ±5%, 1/4W	ARD25T101J	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-4. Z3 PLL, ALC BOARD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R91	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R92	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	Option 001
R93	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	Option 001
R94	MF, 17.8kΩ, ±0.5%, 1/4W	RN14K2E1782D	Option 001
R95	CF, 15kΩ, ±5%, 1/4W	ARD25T153J	Option 001
R96	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R97	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R98	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R99	Not assigned		
R100	CF, 10kΩ, ±5%, 1/4W	ARD25T103J*	
R101	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R102	CF, 10k to 22kΩ, ±5%, 1/4W	ARD25T*J	*
R103	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R104	Not assigned		
R105	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R106	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R107	Not assigned		
R108	Not assigned		
R109	Not assigned		
R110	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R111	MF, 365Ω, ±0.5%, 1/4W	RN14K2E3650D	
R112	Var, MF, 1kΩ	RJ-6S 1kΩ	
R113	MF, 10kΩ, ±0.1%, 1/8W	RN05C2B1002B	
R114	MF, 10kΩ, ±0.1%, 1/8W	RN05C2B1002B	
R115	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R116	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R117 to R127	Not assigned		
R128	Var, MF, 1kΩ~2kΩ	RJ-6S*	*
R129	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R130	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R131	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R132	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	
R133	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	
R134	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R135	Not assigned		
R136	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R137	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R138	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R139	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R140	MF, 100Ω to 10kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R141	CF, 1MΩ, ±5%, 1/4W	ARD25T105J	
R142	CF, 33Ω, ±5%, 1/4W	ARD25T330J	
R143	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R144	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R145	Not assigned		
R146	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R147	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R148	CF, 3.9kΩ, ±5%, 1/4W	ARD25T392J	
R149	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R150	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R151	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R152	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R153	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R154	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R155	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R156	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R157	CF, 330Ω, ±5%, 1/2W	RN14K2H331J	
R158	CF, 10Ω, ±5%, 1/4W	ARD25T100J	
R159	CF, 10Ω, ±5%, 1/4W	ARD25T100J	
R160	Not assigned		
R161	CF, 6.8kΩ, ±5%, 1/4W	ARD25T682J	
R162	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R163	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R164	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R165	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R166	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R167	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R168	CF, 560Ω, ±5%, 1/4W	ARD25T561J	
R169	Not assigned		
R170	MF, 953Ω, ±0.5%, 1/4W	RN14K2E9530D	
R171	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R172	Not assigned		
R173	Not assigned		
R174	Not assigned		
R175	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R176	Not assigned		
R177	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R178	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R179	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R180	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R181	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R182	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R183	Var, MF, 5kΩ	RJ6S 5kΩ	Qty 0~1
R184	CF, 10~15kΩ, ±5%, 1/4W	ARD25T*	*
R185	Var, MF, 2kΩ	RJ-6S 2kΩ	Option 003
R186	Var, MF, 100Ω	RJ-6S 100Ω	Option 003
R187	Not assigned		
R188	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R189	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R190	MF, 1k to 5kΩ, ±0.5%, 1/4W	RN14K2E*D	*
R191	Var, MF, 2kΩ	RJ-6S 2kΩ	
R192	Not assigned		
R193	Var, MF, 100Ω	RJ-6S 100Ω	
R194	Not assigned		
R195	Not assigned		
R196	Posistor, 2.2kΩ	PTH60T222M31.5V	
Z1	Phase detector	SBL-1C	
Z2	Phase detector	SBL-1C	
Z3	Delay line, 3.75nS	1.5D-QEW	

Table 4-5 Z4 CONTROL BOARD

C1 to C11	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C12	Not assigned		
C13	Not assigned		
C14	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C15	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C16	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C17	Cer, 10000pF, ±20%, 50V	CK45D1H103MY	
C18	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C19	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C20	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C21	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C22	Not assigned		
C23	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C24	Plast, 1000pF, ±10%, 50V	ECQ-M05 102KZ	
C25	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C26	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C27	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C28	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C29	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C30	Elect, 4.7μF, ±20%, 63V	KX63VB-4.7	
C31	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C32	Not assigned		
C33	Not assigned		
C34	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C35	Tant, 1μF, ±20%, 35V	CS02H1V010M	
C36	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C37	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C38	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C39	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C40	Plast, 0.01μF, ±10%, 50V	ECQ-M05 103KZ	
C41	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C42	Plast, 0.0047μF, ±10%, 50V	ECQ-M05 472KZ	
C43	Plast, 0.22μF, ±10%, 50V	ECQ-M1H 224KZ	
C44	Tant, 3.3μF, ±20%, 35V	CS02H1C3R3M	
C45	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C46	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C47	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C48	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	Option 002
C49	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	Option 002
C50	Tant, 68μF, ±20%, 25V	CS02H1F680M	Q'ty 0 or 1*

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-5. Z4 CONTROL BOARD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
J1	Connector	P1021-2M	
J2	Connector	P1021-2M	
Q1	IC	P8035L or μPD8035LC or P8049	
Q2	IC	μPB8212C	
Q3	IC	μPB417D	
Q4	IC	μPB417D	
Q5	IC	μPB417D	
Q6	IC	74LS42	
Q7	IC	74LS42	
Q8	IC	74LS00	
Q9	IC	μPB8216D	Option 002
Q10	IC	μPB417D	Option 002
Q11	IC	74LS373	
Q12	IC	74LS373	
Q13	IC	74LS373	
Q14	IC	74LS373	
Q15	Di, Si	1S953	
Q16	IC	74LS04	
Q17	IC	74LS32	
Q18	IC	74LS32	
Q19	IC	74LS02	
Q20	Not assigned		
Q21	IC	74LS32	
Q22	IC	74LS32	
Q23	IC	74LS32	
Q24	IC	TC4040P	
Q25	IC	74LS393	
Q26	IC	74S197	
Q27	IC	74LS244	
Q28	IC	74LS244	
Q29	IC	74LS244	
Q30	IC	MC14503BCP	
Q31	IC	74LS32	
Q32	IC	7407	
Q33	IC	74LS32	
Q34	IC	74LS32	
Q35	Di, array	μPA64H	
Q36	Di, array	μPA64H	
Q37	Di, array	μPA64H	
Q38	Di, array	μPA64H	
Q39	Di, array	μPA64H	
Q40	IC	74S00	
Q41	IC	74LS04	
Q42	IC	74S112	
Q43	IC	74LS490	
Q44	IC	74LS490	
Q45	IC	74LS490	
Q46	IC	74LS221	
Q47	IC	DAC0800LCN or μPC624D	
Q48	IC	DAC0800LCN or μPC624D	
Q49	IC	DAC0800LCN or μPC624D	
Q50	IC	74LS244	
Q51	IC	DAC0800LCN	
Q52	IC	μPC151C	
Q53	IC	74LS157	Option 002
Q54	IC	74S00	Option 002
Q55	IC	74LS05	
Q56	IC	74LS244	
Q57	IC	74LS75	
Q58	IC	74LS367A	
Q59	Tr, Si, NPN	2SC2368	Option 002
Q60	IC	μPC151C	
R1	Not assigned		
R2	Not assigned		
R3	Single-in, line type, array, 3.3kΩ, 1/8W	IHR-10-332JA	3.3kΩ×10
R4	Not assigned		
R5	Not assigned		
R6	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R7	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R8	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R9	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R10	Not assigned		
R11	MF, 6.49kΩ, ±0.5%, 1/4W	RN14K2E6491D	
R12	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R13	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R14	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R15	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R16	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R17	MF, 115kΩ, ±0.5%, 1/4W	RN14K2E1153D	
R18	MF, 118kΩ, ±0.5%, 1/4W	RN14K2E1183D	
R19	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R20	Not assigned		
R21	MF, 215Ω, ±0.5%, 1/4W	RN14K2E2150D	
R22	Not assigned		
R23	Not assigned		
R24	Not assigned		
R25	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R26	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R27	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R28	MF, 5.9kΩ, ±0.5%, 1/4W	RN14K2E5901D	
R29	Not assigned		
R30	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R31	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R32	MF, 13kΩ, ±0.5%, 1/4W	RN14K2E1302D	
R33	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R34	Not assigned		
R35	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R36	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R37	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R38	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R39	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R40	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R41	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R42	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R43	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R44	MF, 4.99kΩ, ±0.5%, 1/4W	RN14K2E4991D	
R45	Single-in, line type, array, 22kΩ, 1/8W	IHR-8-223JA	22kΩ×8
R46	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R47	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R48	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R49	CF, 220Ω, ±5%, 1/4W	ARD25T221J	Q'ty 0 or 1*

Table 4–6 Z5 COUNTER BOARD

CKT REF	DESCRIPTION	PART NAME	NOTE
C1	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C2	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C3	Cer, 8pF, ±0.5pF, 50V	CC92CH1H080DY	
C4	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C5	Cer, 2200pF, ±20%, 50V	CK45D1H222MY	
C6	Cer, 2200pF, ±20%, 50V	CK45D1H222MY	
C7	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C8	Tant, 47μF, ±20%, 6.3V	CS02H0J470M	
C9	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C10	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C11	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C12	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C13	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C14	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C15	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C16	Cer, 33pF, ±20%, 50V	CC92CH1H330MY	
C17	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C18	Cer, 8pF, ±0.5pF, 50V	CC92CH1H080DY	
C19	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C20	Elect, 820μF, 10V	FZT2H1A821	
C21	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C22	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C23	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C24	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C25	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C26	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C27	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C28	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C29	Plast, 0.0047μF, ±10%, 50V	ECQ-M05472KZ	
C30	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C31	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C32	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C33	Not assigned		
C34	Not assigned		
C35	Plast, 0.1μF, ±10%, 50V	ECQ-M05 104KZ	
C36	Not assigned		
C37	Not assigned		
C38	Elect, 10μF, +100/-10%, 16V	CE02B1C100X	
C39	Elect, 10μF, +100/-10%, 16V	CE02B1C100X	
C40	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C41	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C42	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C43	Not assigned		
C44	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C45	Not assigned		

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-6. Z5 COUNTER BOARD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
C46	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C47	Tant, 2.2μF, ±20%, 20V	CS02H1D2R2M	
C48	Tant, 150μF, ±20%, 6.3V	CS02H0J151M	
C49	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C50	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C51	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C52	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C53	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C54	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C55	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C56	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C57	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C58	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C59	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C60	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C61	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C62	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
J1	Connector	HIF3-40P-2.54DSA	40P
J2	Receptacle	27DP-R-PC	
J3	Connector	PI011-10M	10P
J4	Connector	PI011-6M	6P
L1	Coil, 130μH	SF-T8-50D	44L45114D
Q1	IC, hybrid	MC5156	
Q2	Di, PIN	5082-3379	
Q3	IC, hybrid	MC5156	
Q4	Tr, Si, PNP	2SA883	
Q5	IC	μPC251C	
Q6	Not assigned		
Q7	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	
Q8	Not assigned		
Q9	Di, Si	1SS78	
Q10	Tr, Si, NPN	2SC2368	
Q11	Tr, Si, NPN	2SC2368	
Q12	Tr, Si, NPN	2SC2368	
Q13	Tr, Si, NPN	2SC2368	
Q14	Tr, Si, NPN	2SC2368	
Q15	Tr, Si, NPN	2SC2368	
Q16	Di, Si	1S953	
Q17	IC	SP8637B	
Q18	IC	MC14511BCP	
Q19	IC	HD10231	
Q20	IC	HD10124	
Q21	Not assigned		
Q22	Not assigned		
Q23	IC	74LS00	
Q24	IC	74128	
Q25	Tr, Si, NPN	2SC2368	
Q26	Tr, Si, NPN	2SC2368	
Q27	Tr, Si, NPN	2SC2368	
Q28	Tr, Si, NPN	2SC2368	
Q29	Di, breakdown, 1.88 to 2.12V, 400mW	RD2.0EB	
Q30	IC	74LS04	
Q31	IC	74196	
Q32	IC	74LS390	
Q33	IC	74LS490	
Q34	IC	74LS490	
Q35	IC	74LS490	
Q36	Regulator (3 terminals)	FS-7812M (S)	
Q37	Regulator (3 terminals)	FS-7912M (S)	
Q38	IC	74LS00	
Q39	IC	74LS76A	
Q40	IC	74LS00	
Q41	IC	74LS153	
Q42	IC	74LS00	
Q43	IC	74LS00	
Q44	IC	74LS04	
Q45	IC	74LS76A	
Q46	IC	74LS123	
Q47	IC	74LS20	
Q48	IC	74LS00	
Q49	IC	74LS76A	
Q50	IC	74LS00	
Q51	Tr, Si, PNP	2SA883	
Q52	Tr, Si, PNP	2SA883	
Q53	Not assigned		
Q54	Not assigned		
Q55	LSI	HD35503	

CKT REF	DESCRIPTION	PART NAME	NOTE
Q56	Di, array	μPA64H	
Q57	Tr, Si, PNP	2SA883	
Q58	Tr, array	μPA57C	
Q59	Tr, array	μPA57C	
Q60	IC	MC14511BCP	
Q61	Not assigned		
Q62	IC	74LS04	
Q63	IC	74LS10	Option 002
Q64	IC	74LS157	Option 002
Q65	IC	74LS157	Option 002
Q66	IC	TC4532BP	Option 002
Q67	IC	74LS367A	Option 002
Q68	IC	74LS367A	Option 002
Q69	IC (RAM)	μPD2111ALC-4	Option 002
Q70	IC	74LS367A	Option 002
Q71	Not assigned		
Q72	IC	74LS27	Option 002
Q73	IC	74LS00	Option 002
Q74	IC	74LS157	Option 002
Q75	Di, Si	1S953	Option 002
Q76	Tr, Si, NPN	2SC1833	Option 002
Q77	IC	TC4013BP	Option 002
R1	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R2	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R3	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R4	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R5	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R6	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R7	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	
R8	Var, MF, 20kΩ	RJ-6P20kΩ	(BIAS)
R9	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R10	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R11	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R12	CF, 22 to 100Ω, ±5%, 1/4W	ARD25T*J	*
R13	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R14	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	
R15	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R16	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R17	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R18	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R19	Not assigned		
R20	MF, 82Ω, ±5%, 1/4W	NRTF1/4C82ΩJ	
R21	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R22	CF, 12kΩ, ±5%, 1/4W	ARD25T123J	
R23	MF, 10Ω, ±5%, 1/4W	NRTF1/4C10ΩJ	
R24	MF, 100Ω, ±5%, 1/4W	NRTF1/4C100ΩJ	
R25	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R26	MF, 33Ω, ±5%, 1/4W	NRTF1/4C33ΩJ	
R27	CF, 560Ω, ±5%, 1/4W	ARD25T561J	
R28	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R29	CF, 12kΩ, ±5%, 1/4W	ARD25T123J	
R30	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R31	CF, 820Ω ±5%, 1/4W	ARD25T821J	
R32	MF, 33Ω, ±5%, 1/4W	NRTF1/4C33ΩJ	
R33	MF, 33Ω, ±5%, 1/4W	NRTF1/4C33ΩJ	
R34	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R35	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R36	CF, 560Ω, ±5%, 1/4W	ARD25T561J	
R37	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R38	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R39	CF, 51Ω, ±5%, 1/4W	ARD25T510J	
R40	Not assigned		
R41	Not assigned		
R42	Not assigned		
R43	Not assigned		
R44	Not assigned		
R45	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	
R46	CF, 510Ω, ±5%, 1/4W	ARD25T511J	
R47	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R48	Single-in, line type, array, 10kΩ	IHR-4-103JA	10kΩx4
R49	Single-in, line type, array, 330Ω	AHR-331JB	330Ωx7
R50	Single-in, line type, array, 510Ω	IHR-3-511JA	510Ωx3
R51	Not assigned		
R52	Not assigned		
R53	Not assigned		
R54	Not assigned		
R55	CF, 510Ω, ±5%, 1/4W	ARD25T511J	
R56	CF, 390Ω, ±5%, 1/4W	ARD25T391J	
R57	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R58	CF, 270Ω, ±5%, 1/4W	ARD25T271J	
R59	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R60	CF, 200Ω, ±5%, 1/4W	ARD25T201J	

* : Selected at factory

COMPONENT LIST OF SENDING UNIT

Table 4-6. Z5 COUNTER BOARD (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R61	CF, 180Ω, ±5%, 1/4W	ARD25T181J	
R62	CF, 180Ω, ±5%, 1/4W	ARD25T181J	
R63	MF, 3.74kΩ, ±0.5%, 1/4W	RN14K2E3741D	
R64	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R65	CF, 180Ω, ±5%, 1/4W	ARD25T181J	
R66	Not assigned		
R67	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R68	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R69	CF, 33kΩ, ±5%, 1/4W	ARD25T333J	
R70	Single-in, line type, array, 1.2kΩ	IHR-14-122JA	1.2kΩ×14
R71	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R72	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R73	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	
R74	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R75	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R76	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R77	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R78	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R79	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R80	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R81	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R82	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R83	Not assigned		
R84	Not assigned		
R85	CF, 22kΩ, ±5%, 1/4W	ARD25T223J	
R86	Single-in, line type, array, 33kΩ (6.8kΩ)	AHR-333JB (AHR-682JB)	(Option 002)
R87	Single-in, line type, array, 3.3kΩ	IHR-6-332JA	3.3kΩ×6
R88	Single-in, line type, array, 3.3kΩ	IHR-7-332JA	3.3kΩ×7
R89	CF, 510Ω, ±5%, 1/4W	ARD25T511J	
R90	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R91	CF, 68Ω, ±5%, 1/4W	ARD25T680J	
R92	Not assigned		
R93	Not assigned		
R94	Not assigned		
R95	Not assigned		
R96	Not assigned		
R97	Single-in, line type, array, 3.3kΩ	IHR-6-332JA	3.3kΩ×6, Option 002
R98	CF, 5.6kΩ, ±5%, 1/4W	ARD25T562J	Option 002
R99	CF, 68kΩ, ±5%, 1/4W	ARD25T683J	Option 002
R100	CF, 2.2kΩ, ±5%, 1/4W	ARD25T222J	Option 002

Table 4-7 Z6 MOTHER BOARD

C1	Plast, 0.001μF, ±10%, 50V	ECQ-M05 102KZ	
J1	Connector	225J-23621-587	72P
J2	Connector	225J-23621-587	72P
J3	Connector	225J-23621-587	72P
J4	Connector	225J-23621-587	72P
J5	Connector	225J-23621-587	72P
J6	Connector	44J62440	With cable
J7	Connector	HIF3-30P-2.54DSA	30P
J8	Connector	HIF3-40P-2.54DSA	40P
J9	Connector	HIF23A-26D-AC-10	26P

Table 4-8 Z7 SWITCH BOARD

C1	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C2	Elect, 33μF, 16V	KX16T-33	
C3	Elect, 33μF, 16V	KX16T-33	
C4	Tant, 22μF, 16V	CS02H1C220M	
C5	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
C6	Plast, 0.0022μF, ±10%, 50V	ECQ-M05 222KZ	
J1	Connector	HIF3-34P-2.54DSA	34P
K1	Relay	NF2-DC12V	
K2	Not assigned		
K3	Not assigned		
K4	Relay	MT-03A	
Q1	IC	μPC251C	
Q2	IC	74LS00	
Q3	IC	7407	
Q4	Di, Si	1S953	
Q5	Di, Si	1S953	

CKT REF	DESCRIPTION	PART NAME	NOTE
Q6	LED	LN38GP	
Q7	LED	SR-105W	
Q8	Di, breakdown, 3.5 to 3.85V, 400mW	RD3.9EB	
Q9	Di, Si	1S953	
Q10	IC	μPC251C	
R1	MF, 15kΩ, ±0.5%, 1/4W	RN14K2E1502D	
R2	MF, 2kΩ, ±0.5%, 1/4W	RN14K2E2001D	
R3	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R4	MF, 2kΩ, ±0.5%, 1/4W	RN14K2E2001D	
R5	MF,1.5kΩ, ±0.5%, 1/4W	RN14K2E1501D	
R6	MF, 20kΩ, ±0.5%, 1/4W	RN14K2E2002D	
R7	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R8	MF, 4.99kΩ, ±0.5%, 1/4W	RN14K2E4991D	
R9	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R10	Not assigned		
R11	MF, 2kΩ, ±0.5%, 1/4W	RN14K2E2001D	
R12	MF, 931Ω, ±0.5%, 1/4W	RN14K2E9310D	
R13	CF, 6.8Ω, ±5%, 1/4W	ARD25T6R8J	
R14	MF, 1kΩ, ±0.5%, 1/4W	RN14K2E1001D	
R15	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R16	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	
R17	MF, 1.3kΩ, ±0.5%, 1/4W	RN14K2E1301D	
R18	MF, 10kΩ, ±0.5%, 1/4W	RN14K2E1002D	
R19	Not assigned		
R20	Not assigned		
R21	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R22	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R23	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R24	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R25	Not assigned		
R26	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R27	Not assigned		
R28	Var, CF, 5kΩ, 1/8W	RV16YP5kΩB	
R29	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R30	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
R31	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	Q'ty 0 or 1*
R32	CF, 4.7kΩ, ±5%, 1/4W	ARD25T472J	
S1	Pushbutton	44S63292	

Table 4-9 Z8 FRONT BOARD

J1	Connector	HIF3-26P-2.54DSA	26P
J2	Connector	PI011-2M	2P
Q1	LED	LN38GP	
Q2	LED	SR-105W	
R1	Var, CF, 10kΩ	RV24YN30SB10kΩ	With switch
R2	Var, MF, 1kΩ	RG161N10SB1kΩM	
R3	Var, MF, 10kΩ	RG161N10SB10kΩ	
R4	Var, MF, 1kΩ	GF281 30SB1kΩ	
S1	Switch	1F2UEE	
S2	Switch	SL7-4(PH)-8H	

Table 4-10 Z9 MARKER DELAY

C1 to C12	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C13	Not assigned		
C14	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C15	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C16	Cer 4700pF, ±20% 50V	CK45D1H472MY	
C17	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C18	Not assigned		
C19	Not assigned		
C20	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	

* : Selected at factory

Table 4-10. Z9 MARKER DELAY (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
C21	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C22	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C23	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C24	Not assigned		
C25	Plast, 0.047μF, ±10%, 50V	ECQ-M05 473KZ	
C26	Cer, 330pF, ±5%, 50V	RPE111CH331JY50	
C27	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C28	Elect, 1μF, 16V	CA92C-1C-1R000-R56	
C29	Tant, 47μF, ±20%, 6.3V	CS02H0J470M	
J1	Connector	57-40240-D39	24P
J2	Connector	HIF3-26P-2.54DSA	26P
J3	Connector	PI011-05M	5P
J4 to J13	Terminal (P)	60599-3	
J14 to J23	Terminal (J)	60983-1	
Q1	IC	μPC177C	
Q2	IC	μPD2101ALC-4	
Q3	IC	74LS669	
Q4	IC	74LS669	
Q5	IC	74LS74A	
Q6	IC	74LS03	
Q7	Di, breakdown, 4.95 to 5.25V, 400mW	RD5.1E (3)	
Q8	Di, Si	1S953	
R1	Single-in, line type, array, 6.8kΩ, 1/8W	IHR-9-682JA	6.8kΩx9
R2	CF, 47Ω, ±5%, 1/4W	ARD25T470J	
R3	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R4	CF, 330Ω, ±5%, 1/4W	ARD25T331J	
R5	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R6	CF, 100kΩ, ±5%, 1/4W	ARD25T104J	
R7	CF, 1.8kΩ, ±5%, 1/4W	ARD25T182J	
R8	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R9	CF, 820Ω, ±5%, 1/4W	ARD25T821J	
R10	CF, 18kΩ, ±5%, 1/4W	ARD25T183J	
R11	CF, 470Ω, ±5%, 1/4W	ARD25T471J	
R12	Var, MF, 1kΩ	RJ-6P 1kΩ	(HOR PHASE)
R13	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R14	CF, 10kΩ, ±5%, 1/4W	ARD25T103J	
R15	Var, MF, 100Ω	RJ-6P 100Ω	(+5V ADJ)

Table 4-11 Z10 COUNTER INPUT

C1	Not assigned		
C2	Cer, 10pF, ±0.5pF, 50V	CC92CH1H100DY	
C3	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C4	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C5	Cer, 9pF, ±0.5pF, 50V	CC92CH1H090DY	
C6	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C7	Cer, 8pF, ±0.5pF, 50V	CC92CH1H080DY	Q'ty 0 or 1,*
C8	Cer, 4700pF, ±20%, 50V	RPD670C472M50	
C9	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	Option 002
C10	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C11	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C12	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C13	Cer, 2200pF, ±20%, 50V	CK45D1H222MY	
C14	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C15	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	
C16	Cer, 4700pF, ±20%, 50V	CK45D1H472MY	Option 002
J1	Receptacle	J12-2	
J2	Not assigned		
J3	Not assigned		
J4	Plug	27DP-P-1.5	
J5	Connector	PI011-10F	10P
J6	Plug	27DP-P-1.5	Option 002
J7	Terminal (J)	60983-1	Option 002
J8	Terminal (J)	60983-1	Option 002
L1	Coil, 100μH	LF8-101K	34L55661

CKT REF	DESCRIPTION	PART NAME	NOTE
Q1	Di, Si	1S2222	
Q2	Di, Si	1S2222	
Q3	Tr, Si, NPN	2SC2368	
Q4	Di, Si	1S2222	
Q5	Di, Si	1S2222	
Q6	Di, PIN	5082-3379	
Q7	IC, hybrid	MC5156	
Q8	IC, hybrid	MC5156	Option 002
Q9	IC	μPC254A	Option 002
Q10	IC	μPC151C	Option 002
Q11	Di, breakdown, 4.8 to 5.4V, 400mW	RD5.1EB	Option 002
R1	MF, 22Ω, ±5%, 1/4W	NRTF1/4C22ΩJ	
R2	CF, 560kΩ, ±5%, 1/4W	ARD25T564J	Q'ty 2, in series
R3	Not assigned		
R4	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R5	Not assigned		
R6	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R7	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R8	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R9	CF, 100Ω, ±5%, 1/4W	ARD25T101J	
R10	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R11	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R12	MF, 50Ω, ±5%, 1/4W	NRTF1/4C50ΩJ	
R13	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R14	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R15	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R16	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R17	CF, 22Ω, ±5%, 1/4W	ARD25T220J	Option 002
R18	MF, 47Ω, ±5%, 1/4W	NRTF1/4C47ΩJ	Option 002
R19	Not assigned		
R20	Not assigned		
R21	CF, 22kΩ, ±5%, 1/4W	5T223J	Option 002
R22	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	Option 002
R23	MF, 4.75kΩ, ±0.5%, 1/4W	RN14K2E4751D	Option 002
R24	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	Option 002
R25	MF, 48.7kΩ, ±0.5%, 1/4W	RN14K2E4872D	Option 002
R26	CF, 100Ω, ±5%, 1/4W	ARD25T101J	Option 002
R27	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	Option 002
R28	Var, MF, 20kΩ	RJ-6P 20kΩ	Option 002 (OFFSET)
R29	CF, 47kΩ, ±5%, 1/4W	ARD25T473J	Option 002
R30	Var, MF, 1kΩ	RJ-6P 1kΩ	Option 002 (THRESHOLD)
R31	CF, 470Ω, ±5%, 1/4W	ARD25T471J	Option 002
R32	CF, 150kΩ, ±5%, 1/4W	ARD25T154J	Option 002
R33	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	Option 002
S1	Pushbutton	44S64301	
(S1)	Pushbutton	44S62617	Option 002

Table 4-12 Z11 COUNTER DISPLAY

J1	Connector	HIF23-40D-AA49.5	40P
Q1	Counter display	5082-7653	
Q2	Counter display	5082-7653	
Q3	Counter display	5082-7653	
Q4	Counter display	5082-7653	
Q5	Counter display	5082-7653	
Q6	Counter display	5082-7653	
Q7	Counter display	5082-7653	
Q8	Counter display	5082-7653	
Q9	Counter display	5082-7653	
Q10	LED	SR-105W	
Q11	LED	SR-105W	
Q12	LED	SR-105W	
Q13	LED	SR-105W	
Q14	LED	SR-105W	
Q15	LED	SR-105W	
Q16	LED	SR-105W	
Q17	LED	SR-105W	

* : Selected at factory

CONPONENT LIST OF SENDING UNIT

Table 4-12. Z11 COUNTER DISPLAY (Continued)

CKT REF	DESCRIPTION	PART NAME	NOTE
R1	Single-in, line type, array, 470Ω	IHR-3-471JA	470Ω×3
R2	Single-in, line type, array, 3.3kΩ	IHR-6-332JA	3.3kΩ×6
S1	Pushbutton	44S62618	

Table 4-13 Z12 DIGITAL SWITCH BOARD

J1	Connector	44J62285	With cable
S1	Digital switch	44S60213	

Table 4-14 Z22 VCO

C1	Cer, 22pF, ±5%, 50V	GR40CH220J50V	
C2	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C3	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C4	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C5	Cer, 100pF, ±5%, 50V	GR40CH101J50V	
C6	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C7	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C8	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C9	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C10	Not assigned		
C11	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C12	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C13	Cer, 1000pF, ±20%, 50V	CK45D1H102MY	
C14	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C15	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C16	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C17	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C18	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C19	Cer, 0.5 to 1pF, ±0.25pF, 50V	RD340CK*CY50	*
C20	Not assigned		
C21	Cer, 100pF, ±5%, 50V	GR40CH101J50V	
C22	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C23	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C24	Cer, 22pF, ±5%, 50V	GR40CH220J50V	
C25	Cer, 22pF, ±5%, 50V	GR40CH220J50V	
C26	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C27	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C28	Cer, 0.022μF, ±20%, 50V	RPN710C223M	
C29	Tant, 0.1μF, ±20%, 35V	CS02H1V0R1M	
C30	Not assigned		
C31	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C32	Tant, 22μF, ±20%, 16V	CS02H1C220M	
C33	Cer, 1pF, ±0.25pF, 50V Cer, 22pF, ±5%, 50V	RD340CK010CY50 CC92CH1H220JY	*
C34	Cer, 68pF, ±10%, 50V	DF553YN680KY50	
C35	Cer, 1000pF, +100/-0%, 50V	DF553F102PY50	
C36	Cer, 1000pF, +100/-0%, 50V	DF553F102PY50	
C37	Cer, 1000pF, +100/-0%, 50V	DF553F102PY50	
C38	Cer, 1000pF, +100/-0%, 50V	DF553F102PY50	
C39	Cer, 1000pF, +100/-0%, 50V	DF553F102PY50	
C40	Cer, 1pF, ±0.25pF, 50V	RD340CK010CY50	
C41	Cer, 10pF, ±0.5pF, 50V	CC92CH1H100DY	
J1	Connector	PI011-2F	2P
J2	Cable	HRM208B	
J3	Connector	PI01T-2F	2P
L1	Coil	SP0408-R10M	
L2	Coil	44L46053D	
L3	Coil	44L46053E	
L4	Coil	44L46053A	
L5	Coil	44L60727	
L6	Microinductor	LF8-102K	
L7	Microinductor	LF8-102K	
L8	Coil	SP0408-R68M	

CKT REF	DESCRIPTION	PART NAME	NOTE
Q1	Tr, Si, NPN	2SC2149	
Q2	IC	SP8617B	
Q3	IC	SP8620B	
Q4	Tr, Si, PNP	2SA606 Ⓢ or 2SA883	
Q5	Tr, Si, NPN	2SC1275	
Q6	Tr, Si, NPN	2SC1275	
Q7	Tr, Si, NPN	2SC2149	
Q8	Di, Si	1S2208	
Q9	Di, Si	1S2208	
Q10	Not assigned		
Q11	Tr, Si, NPN	2SC2149	
R1	Tip resistor, 3.3kΩ, ±5%, 1/10W	3.3kΩJ	
R2	Tip resistor, 1kΩ, ±5%, 1/10W	1kΩJ	
R3	Tip resistor, 150Ω, ±5%, 1/10W	150ΩJ	
R4	Tip resistor, 680Ω, ±5%, 1/10W	680ΩJ	
R5	Tip resistor, 680Ω, ±5%, 1/10W	680ΩJ	
R6	CF, 1.2kΩ, ±5%, 1/4W	ARD25T122J	
R7	CF, 1.5kΩ, ±5%, 1/4W	ARD25T152J	
R8	CF, 1kΩ, ±5%, 1/4W	ARD25T102J	
R9	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R10	CF, 220Ω, ±5%, 1/4W	ARD25T221J	
R11	MF, 470Ω, ±5%, 1/2W	RN14K2H471J	
R12	CF, 1kΩ to 10kΩ, ±5%, 1/4W	ARD25T * J	*Q'ty 0 to 1
R13	CF, 680Ω, ±5%, 1/4W	ARD25T681J	
R14	CF, 150Ω, ±5%, 1/4W	ARD25T151J	
R15	MF, 61.6Ω, ±0.5%. 1/4W	NRN1/4C4 61.6ΩD	
R16	MF, 105Ω, ±0.5%, 1/4W	NRN1/4C4 105ΩD	
R17	MF, 105Ω, ±0.5%, 1/4W	NRN1/4C4 105ΩD	
R18	Tip resistor, 1kΩ, ±5%, 1/10W	1kΩJ	
R19	CF, 3.3kΩ, ±5%, 1/4W	ARD25T332J	
R20	Not assigned		
R21	Tip resistor, 150Ω, ±5%, 1/10W	150ΩJ	
R22	Not assigned		
R23	Not assigned		
R24	CF, 2.7kΩ, ±5%, 1/4W	ARD25T272J	
R25	Not assigned		
R26	Tip resistor, 3.3kΩ, ±5%, 1/10W	3.3kΩJ	
R27	Tip resistor, 1kΩ, ±5%, 1/10W	1kΩJ	
R28	Tip resistor, 100Ω, ±5%, 1/10W	100ΩJ	
R29	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R30	Not assigned		
R31	CF, 22Ω, ±5%, 1/4W	ARD25T220J	
R32	Not assigned		
R33	Not assigned		
R34	Not assigned		
R35	Tip resistor, 150Ω, ±5%, 1/10W	150ΩJ	
R36	CF, 82Ω to 100Ω, ±5%, 1/4W	ARD25T * J	*

* : Selected at factory

SECTION 4

ASSEMBLIES

CONTENTS PAGE

1. DISPLAYING UNIT 4-1
A. Cover Removal 4-1
2. SENDING UNIT 4-15
3. DEVICES ASSEMBLIES 4-21

1. DISPLAYING UNIT

A. Cover Removal

1.01 Remove the covers as described below.

(a) Remove the 10 screws in Fig. 1, and lift off the top cover.

(b) Remove the 4 screws (Displaying Unit) or the 8 screws (Sending Unit) in Fig. 1, and remove the bottom cover.

Figures 4 to 11 show Displaying Unit Assemblies.

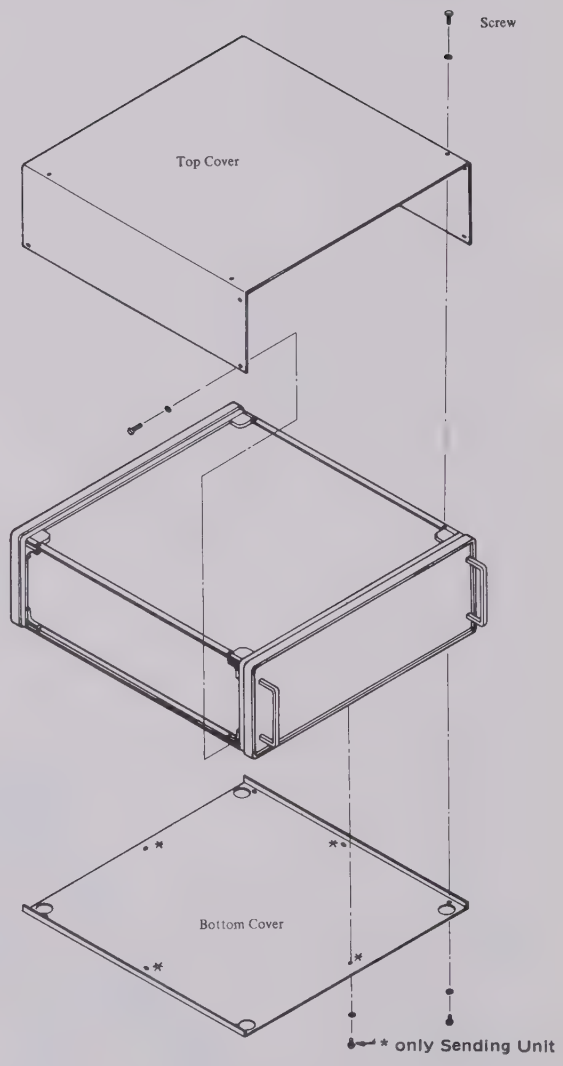


Fig. 1—Displaying Unit and Sending Unit Cover Removal

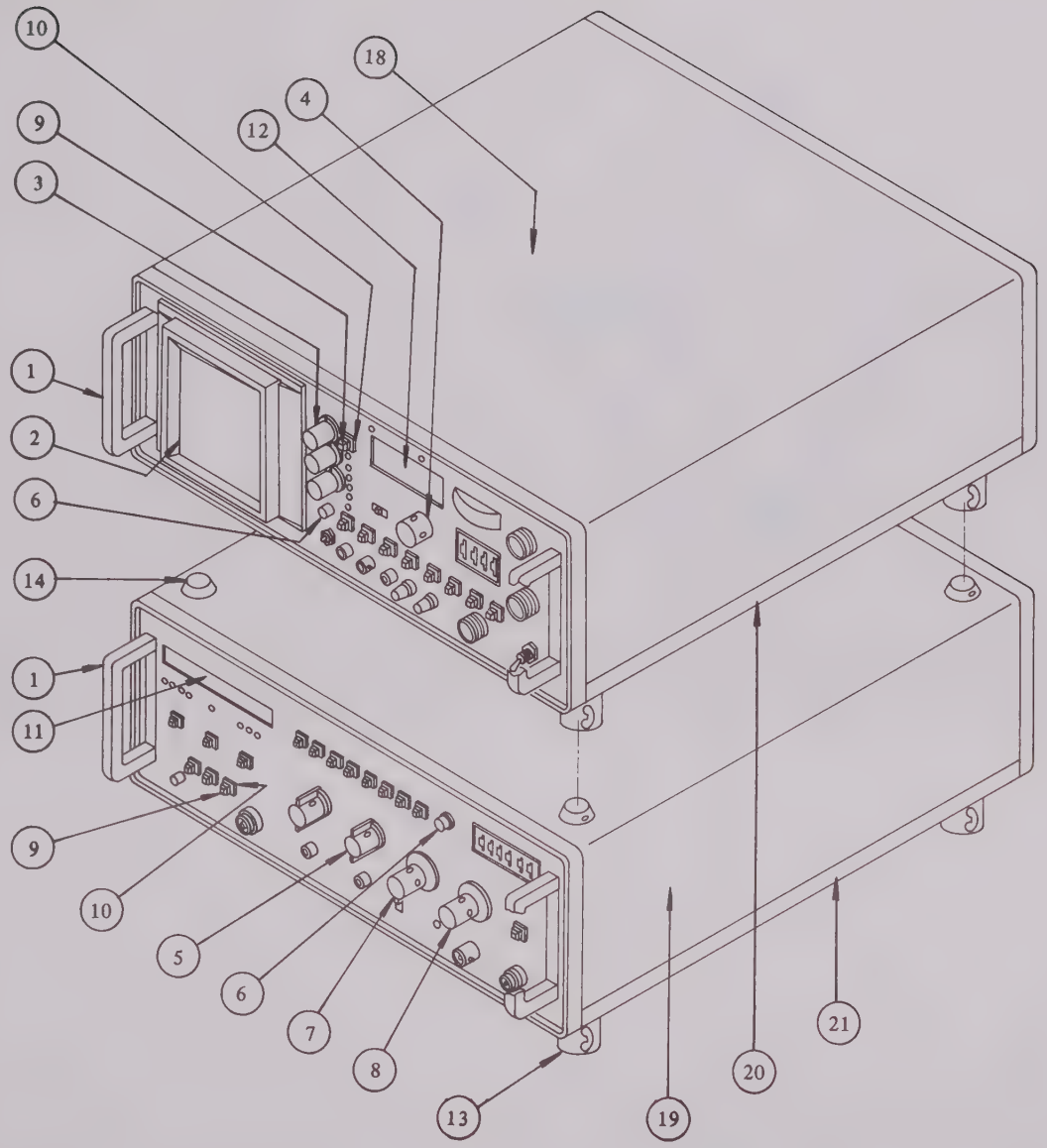


Fig. 2—Front Panel Mechanical Parts

EXTERNAL MECHANICAL PARTS

No.	PARTS NAME	
1	B1	HANDLE
2	B2	BEZEL
3	B3	KNOB
4	B4	KNOB
5	B5	KNOB
6	B6	KNOB
7	B7	DIAL
8	B8	DIAL
9	B9	PUSH BUTTON
10	B10	BUTTON FRAME
11	B11	FILTER
12	B12	FILTER
13	B13	FOOT
14	B14	FOOT PAD
15	B15	HEAT SINK
16	B16	COVER
17	B17	FUSE HOLDER
18	B18	TOP COVER
19	B19	TOP COVER
20	B20	BOTTOM COVER
21	B21	BOTTOM COVER

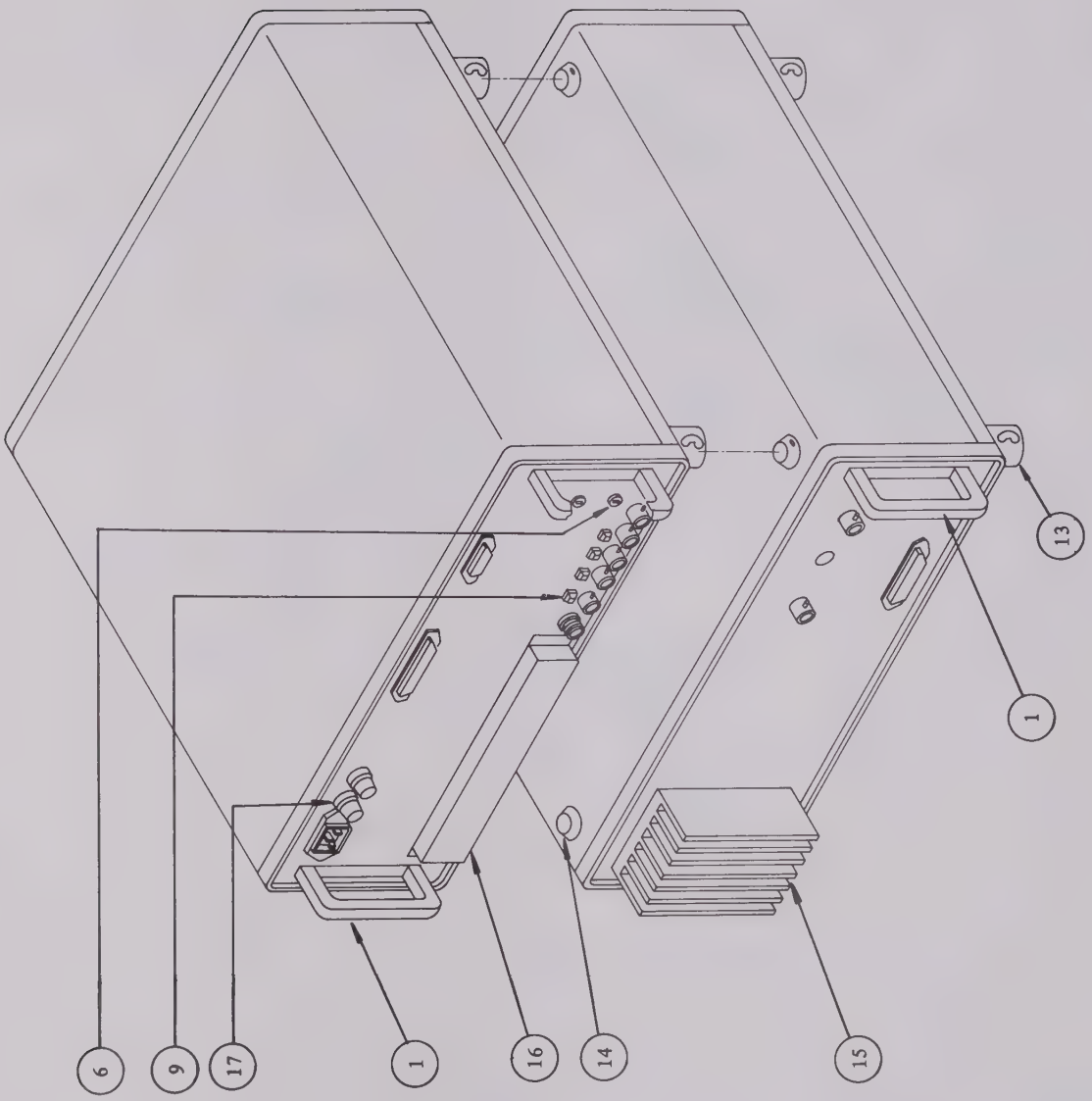
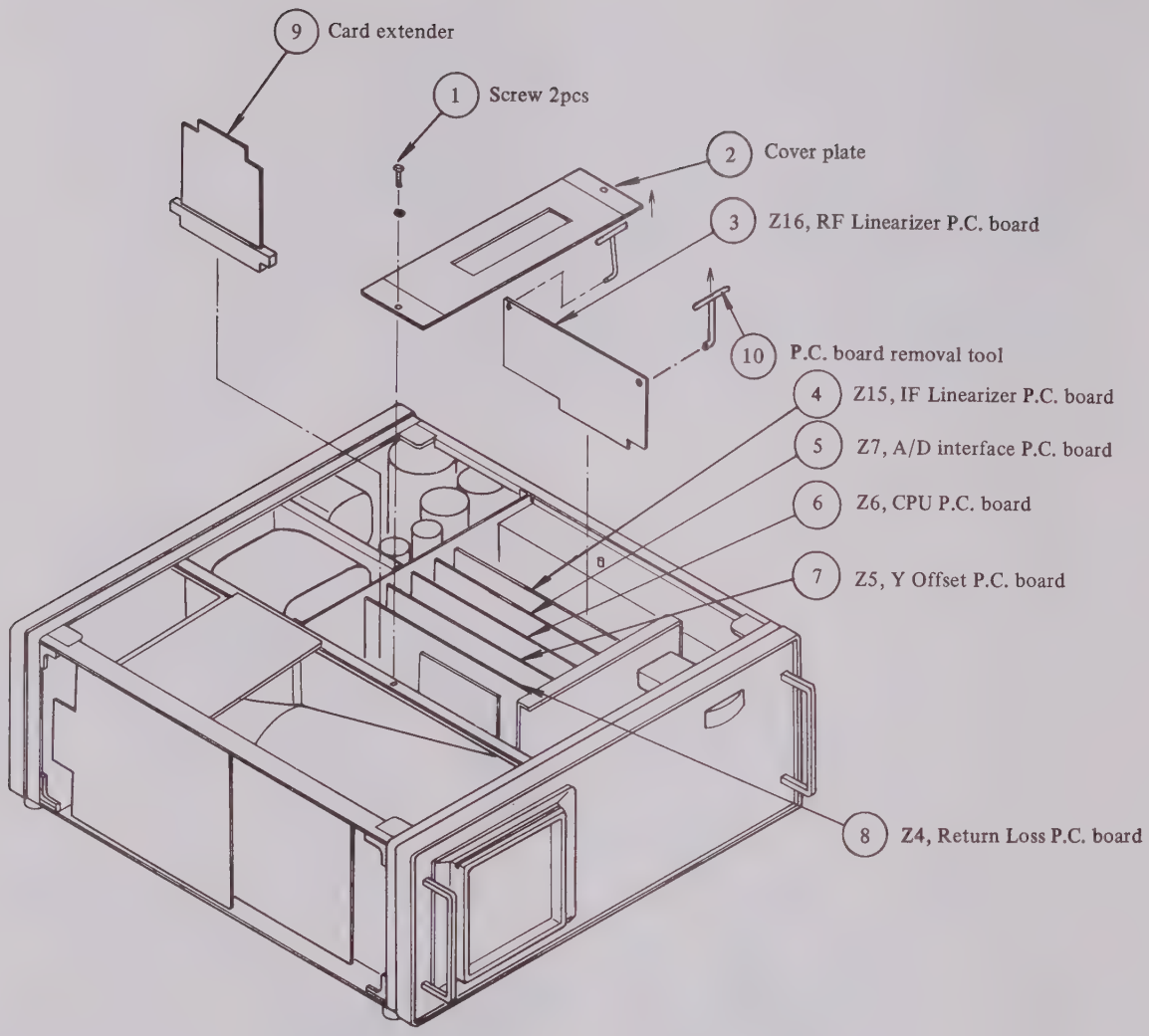


Fig. 3—Rear Panel Mechanical Parts


9 Card extender
1 Screw 2pcs
2 Cover plate
3 Z16, RF Linearizer P.C. board
10 P.C. board removal tool
4 Z15, IF Linearizer P.C. board
5 Z7, A/D interface P.C. board
6 Z6, CPU P.C. board
7 Z5, Y Offset P.C. board
8 Z4, Return Loss P.C. board

P.C. Board Removal

1. Insert the P.C. Board removal tools (10) into the Z16 P.C. board as shown in figures.
2. Lift up the tools as indicated by the arrows. This will lift the board slightly and loosen it.
3. Remove the board by hand.

Fig. 4—Displaying Unit P.C. Board Removal

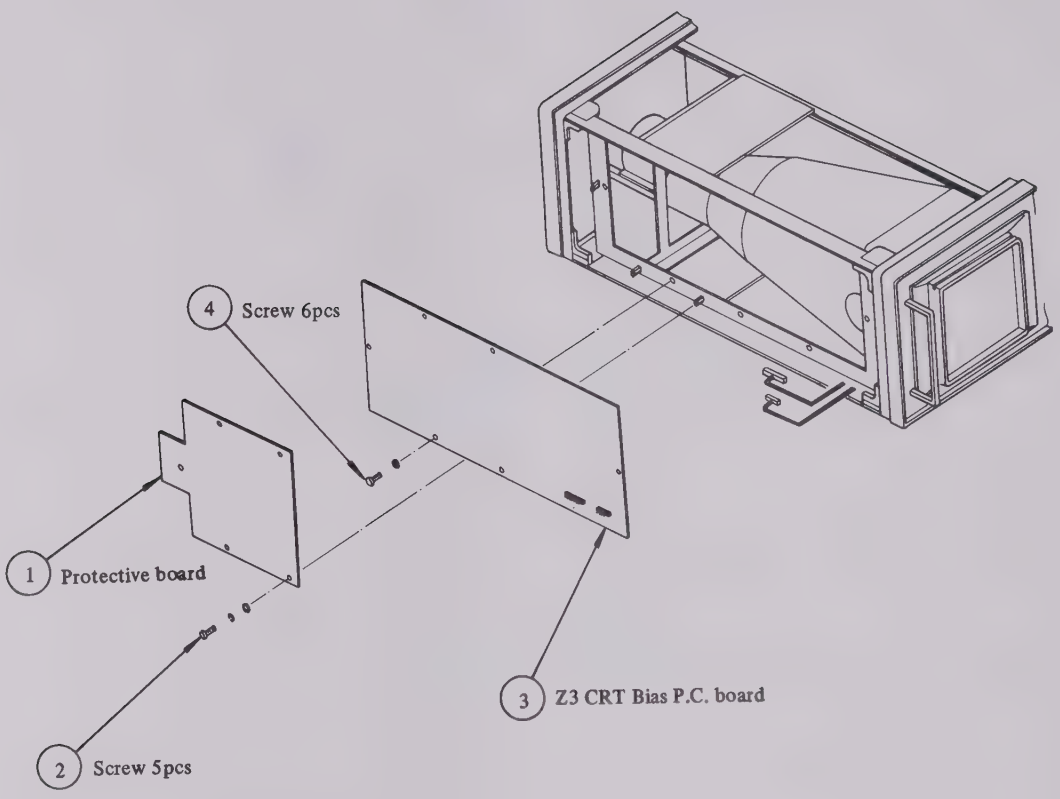
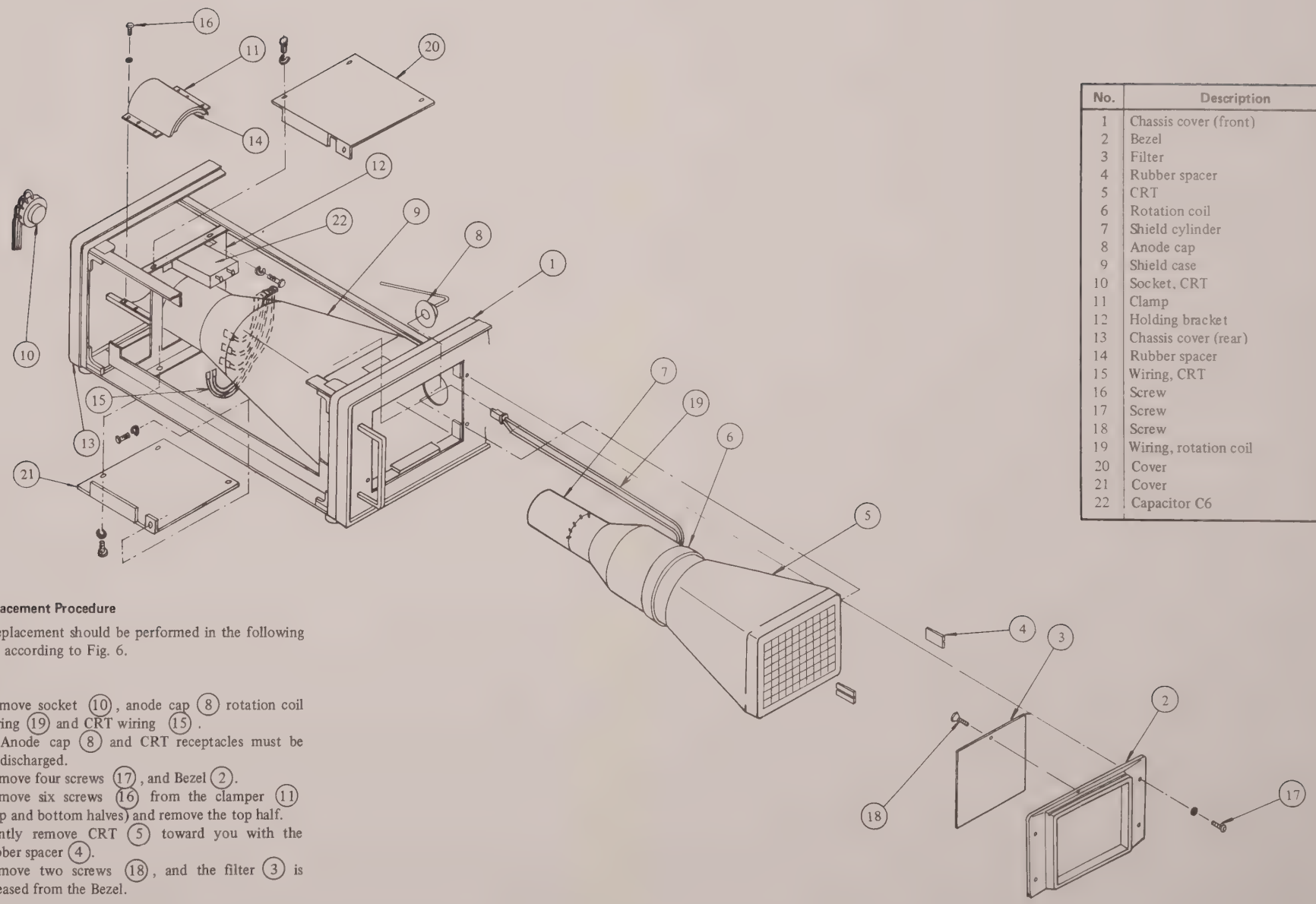


Fig. 5—CRT Bias P.C. Board Z3 Removel



No.	Description	Q'ty
1	Chassis cover (front)	1
2	Bezel	1
3	Filter	1
4	Rubber spacer	2
5	CRT	1
6	Rotation coil	1
7	Shield cylinder	1
8	Anode cap	1
9	Shield case	1
10	Socket, CRT	1
11	Clamp	1
12	Holding bracket	1
13	Chassis cover (rear)	1
14	Rubber spacer	1
15	Wiring, CRT	1
16	Screw	6
17	Screw	4
18	Screw	1
19	Wiring, rotation coil	1
20	Cover	1
21	Cover	1
22	Capacitor C6	1

CRT Replacement Procedure

CRT replacement should be performed in the following procedure according to Fig. 6.

Removal

1. Remove socket (10), anode cap (8) rotation coil wiring (19) and CRT wiring (15).

Note: Anode cap (8) and CRT receptacles must be discharged.

2. Remove four screws (17), and Bezel (2).
3. Remove six screws (16) from the clamper (11) (top and bottom halves) and remove the top half.
4. Gently remove CRT (5) toward you with the rubber spacer (4).
5. Remove two screws (18), and the filter (3) is released from the Bezel.

Installation

CRT installation should be performed in the reverse procedure above. Fix a new rubber spacer (14) on the clamp.

Fig. 6–CRT & Shield Assembly

No.	Description	Q'ty
1	Bezel	1
2	Screw	4
3	Thumb wheel switch CORRECTION FACTOR dB	1
4	SI, Switch, POWER	1
5	Nut	1
6	Screw	4
7	Panel front	1
8	INTENSITY control	1
9	VERTICAL POSITION control	1
10	HORIZONTAL GAIN control	1
11	Cap screw	1
12	MARKER FREQUENCY ±MHz control	1
13	Cap screw	1
14	J14 MODEL J12-2 connector	1
15	Nut	1
16	J16 MODEL J12-2 connector	1
17	J15 Connector, female BNC	1
18	Nut, for (17)	1
19	Reference oscillator	1
20	Screw	3
21	PEAKING METER dB	1
22	Screw	2
23	blank	—
24	Screw P.C. Board (28)	1
25	Screw	4
26	Plate, sub panel	1
27	Z11 marker P.C. Board	1
28	Z12 Digital Display P.C. Board	1
29	Push switch, OFFSET	1
30	Filter, display	1

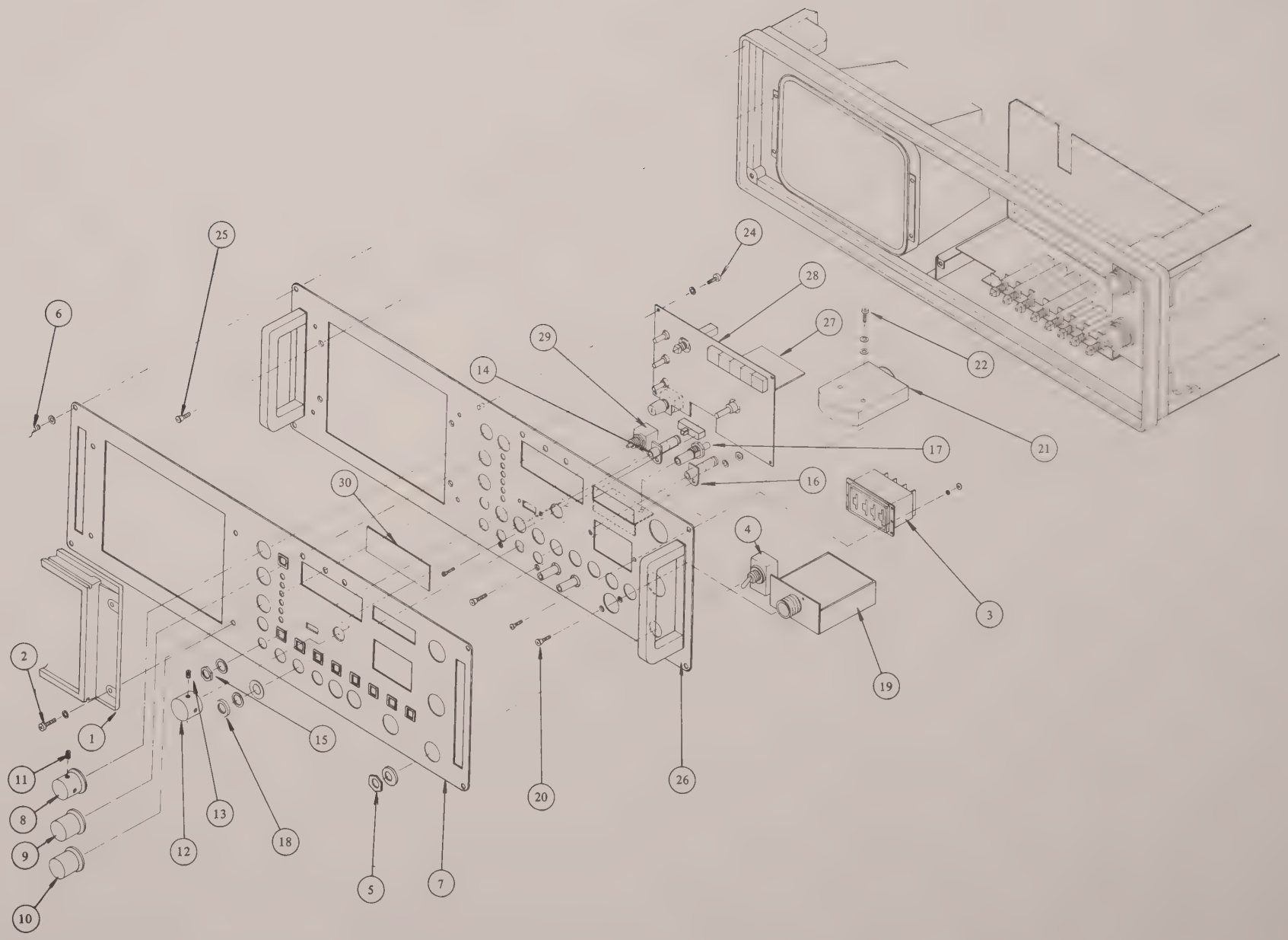


Fig. 7—Displaying Unit Assembly, Overall

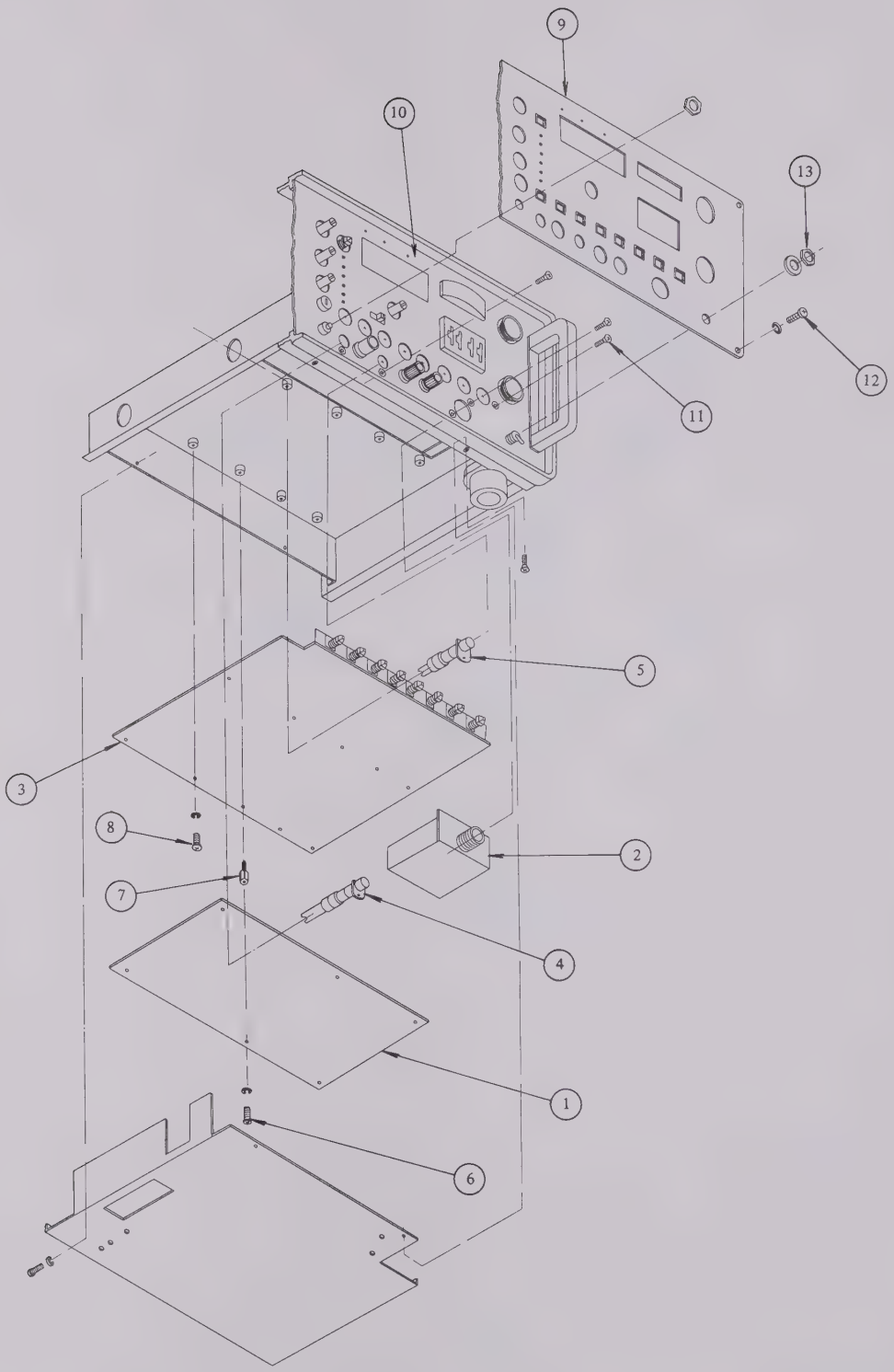


Fig. 8—Displaying Unit Assembly, Right Side 1

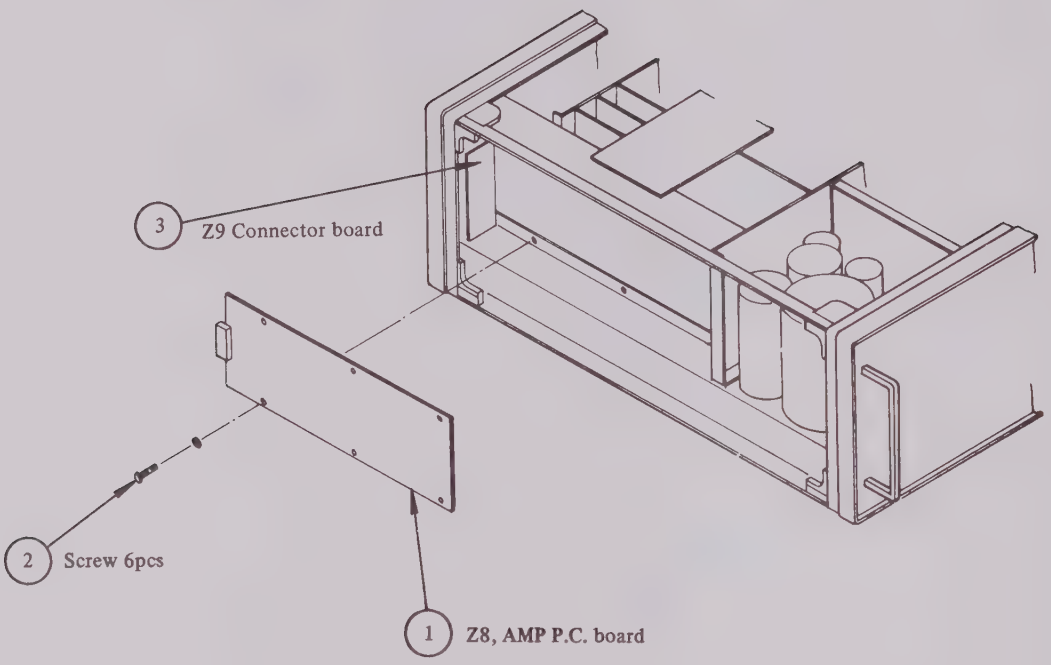
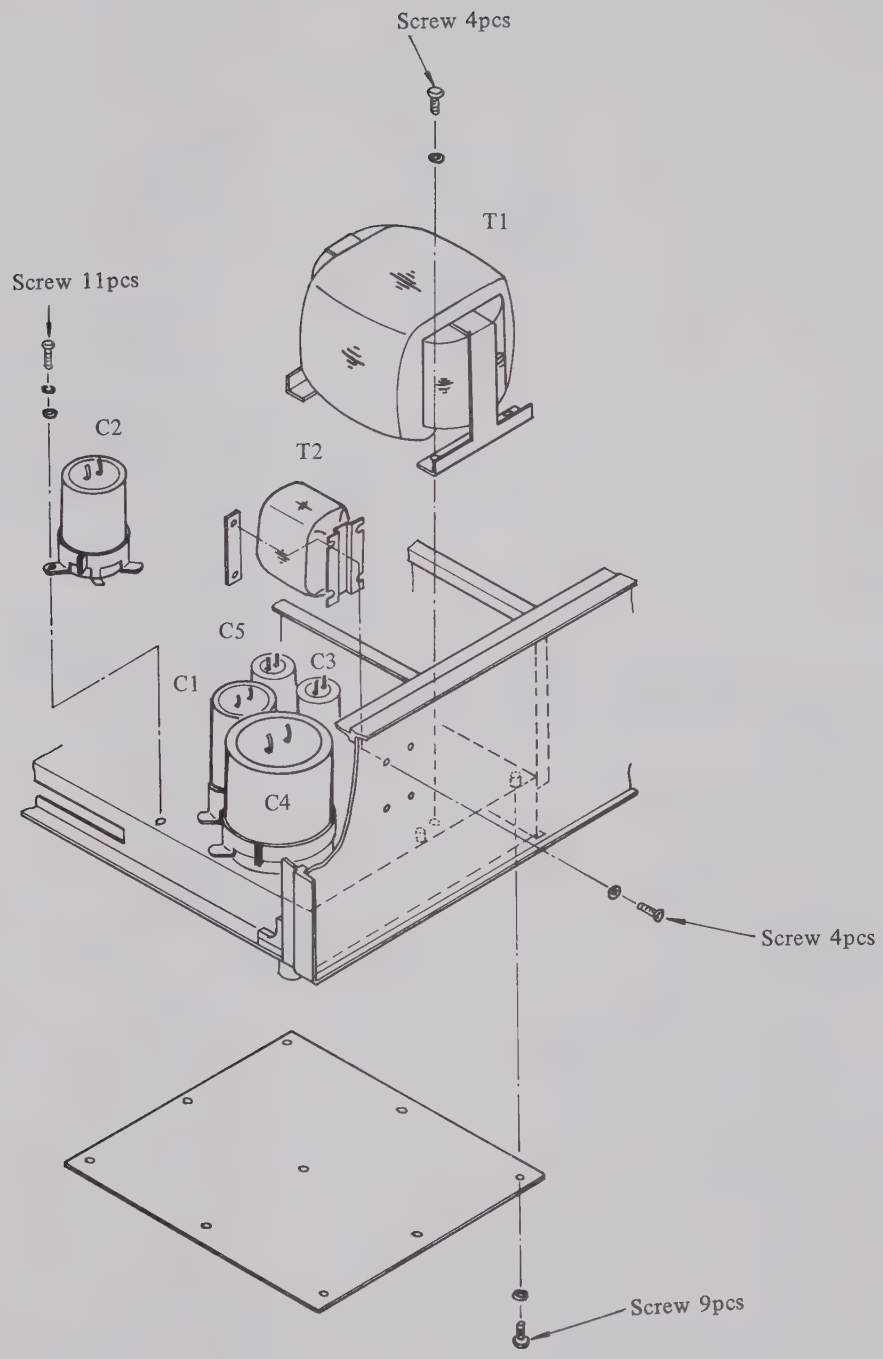
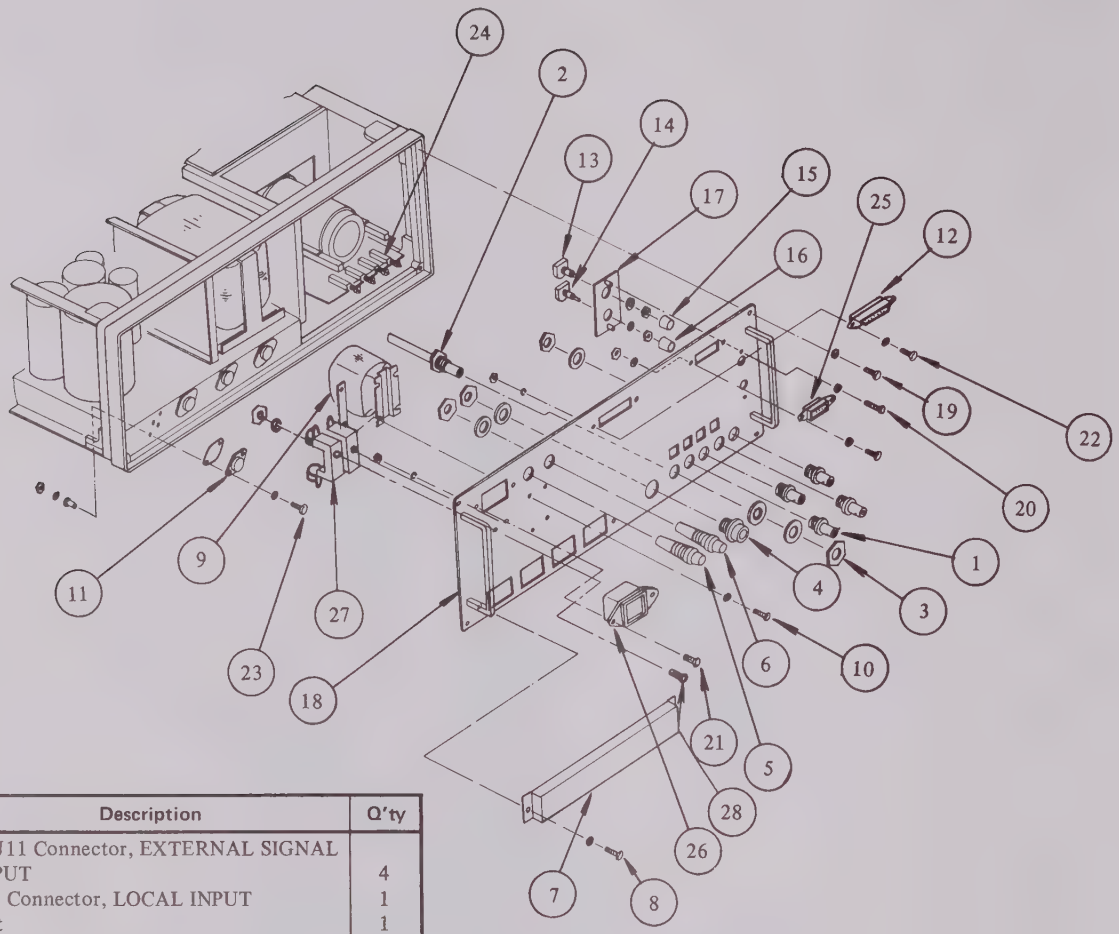


Fig. 9—Displaying Unit Assembly, Right Side II



Z, Power Source P.C. board

Fig. 10—Power Supply Assembly Z2

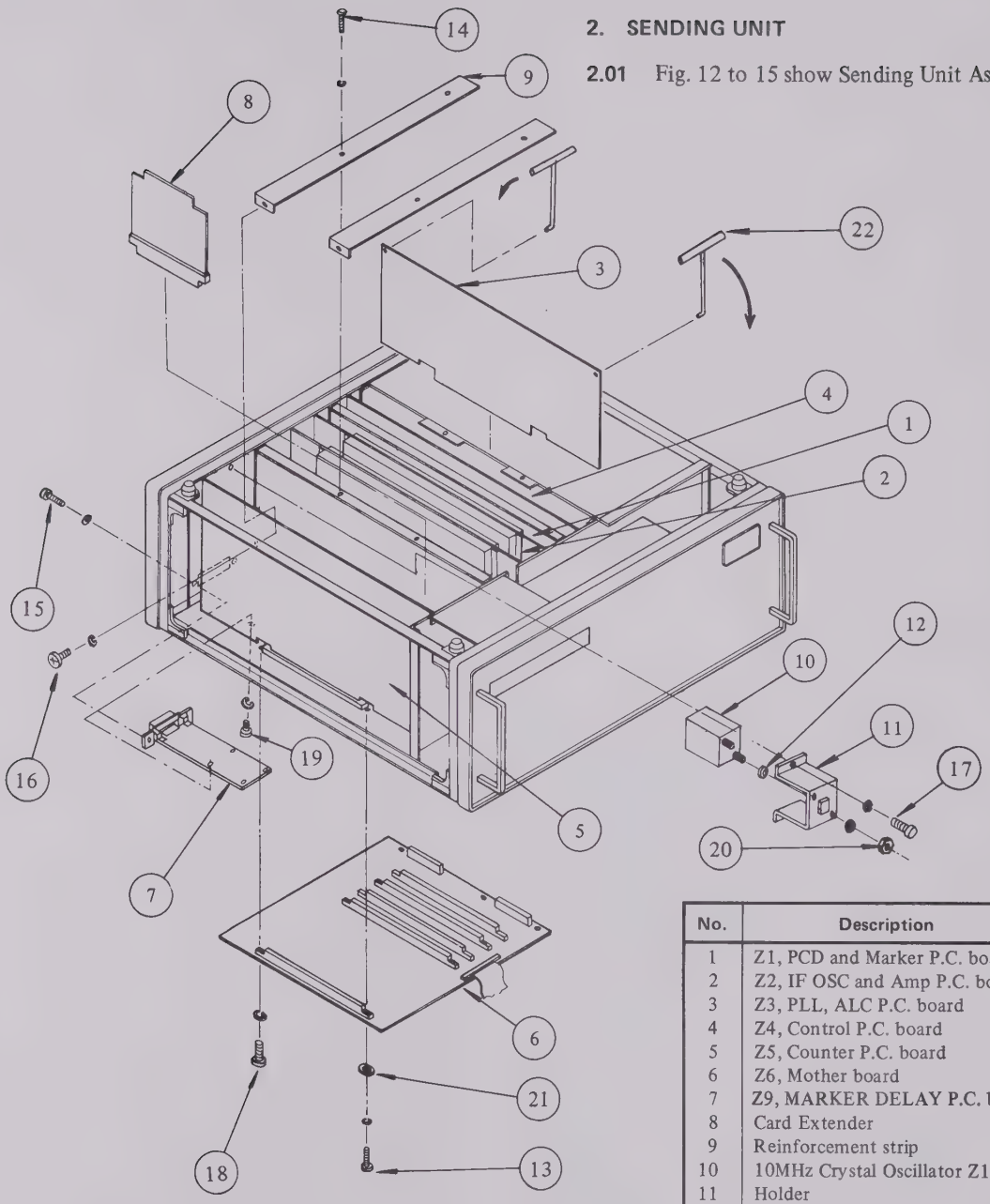


No.	Description	Q'ty
1	J8-J11 Connector, EXTERNAL SIGNAL INPUT	4
2	J13 Connector, LOCAL INPUT	1
3	Nut	1
4	J7 Connector, DC OUTPUT to IF AMP	1
5	F1 Fuse holder, MAIN	1
6	F2 Fuse holder, OVEN	1
7	Cover	1
8	Screw	2
9	T2, Transformer	1
10	Screw	4
11	Transistor, power	1
12	Connector, RECORDER OUTPUT	1
13	R2 Variable Resistor, TRACEROTATION	1
14	R1 Variable Resistor, FOCUS	1
15	TRACE ROTATION control	1
16	FOCUS control	1
17	Plate V.R.	1
18	Rear Panel	1
19	Screw	4
20	Screw	2
21	Screw	2
22	Screw	2
23	Screw	8
24	Z13 PRE AMP P.C. Board	1
25	Connector DC OUTPUT	1
26	J1 Connector Power Supply	1
27	Fuse holder	2
28	Screw	2

Fig. 11—Displaying Unit Assembly, Rear Panel

2. SENDING UNIT

2.01 Fig. 12 to 15 show Sending Unit Assemblies.

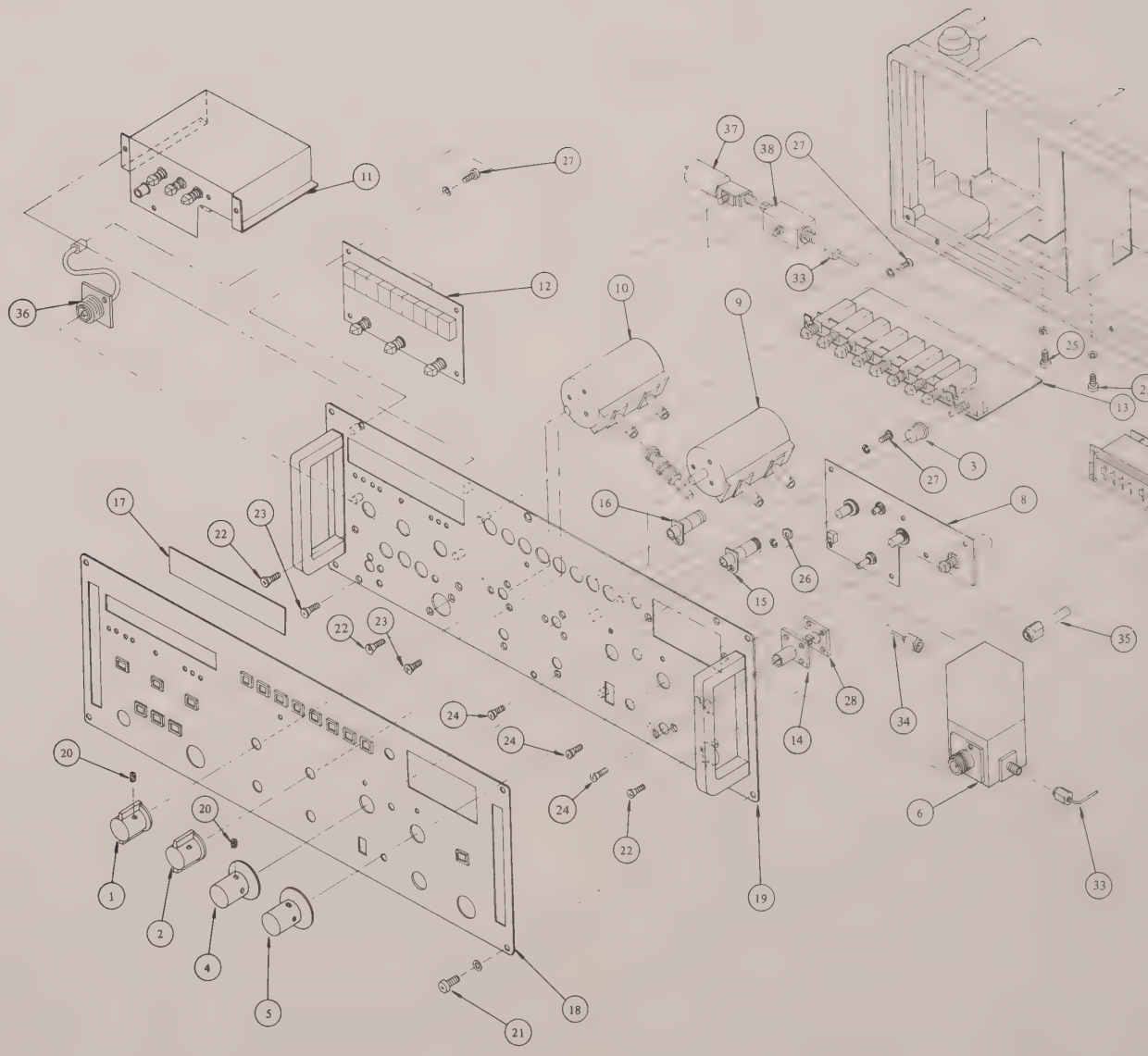


No.	Description	Q'ty
1	Z1, PCD and Marker P.C. board	1
2	Z2, IF OSC and Amp P.C. board	1
3	Z3, PLL, ALC P.C. board	1
4	Z4, Control P.C. board	1
5	Z5, Counter P.C. board	1
6	Z6, Mother board	1
7	Z9, MARKER DELAY P.C. board	1
8	Card Extender	1
9	Reinforcement strip	2
10	10MHz Crystal Oscillator Z13	1
11	Holder	1
12	Insulation Washer	2
13	Screw	9
14	Screw	4
15	Screw	2
16	Screw	2
17	Screw	2
18	Screw	1
19	Screw	4
20	Nut	2
21	Flat washer	9
22	P.C. board removal tool	2

P.C. Board Removal

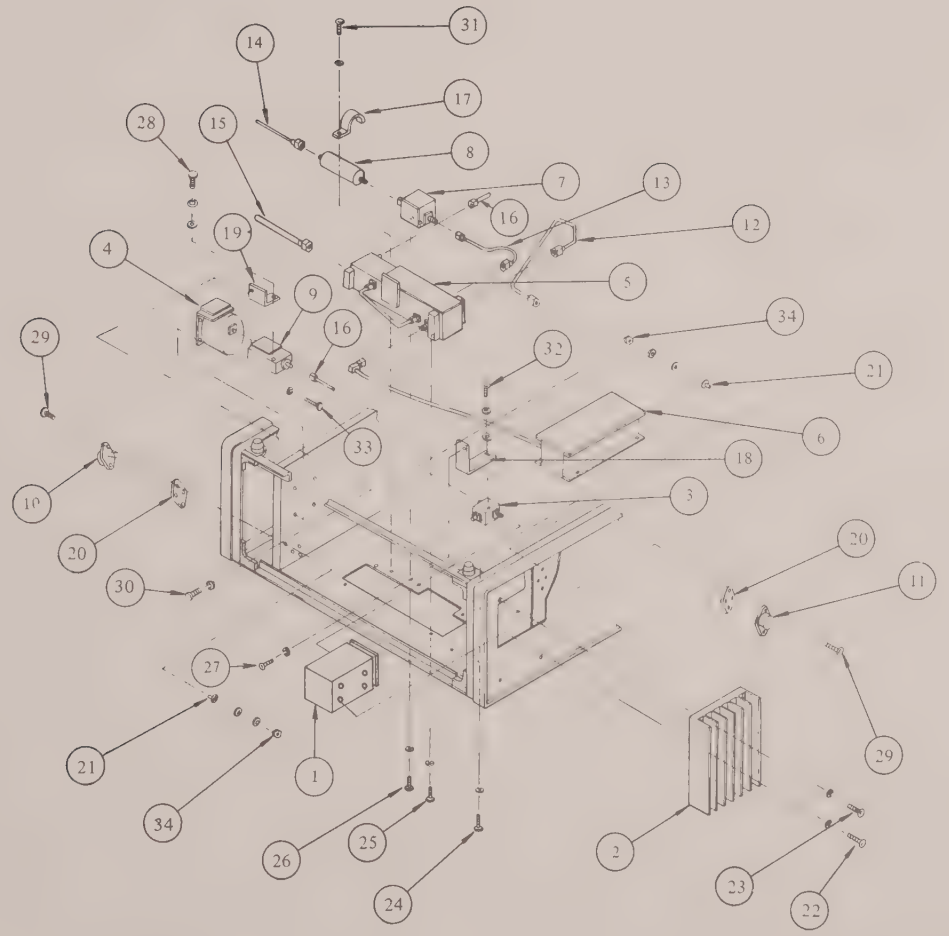
1. Insert the P.C. Board removal tool (22) into the Z3 P.C. board as shown in figures.
2. Turn the tools outward, as indicated by the arrows. This will lift the board slightly and loosen it.
3. Remove the board by hand.

Fig. 12—Sending Unit P.C. Board Removal



No.		Option	Q'ty
1	IF LEVEL dBm control, 10dB step		1
2	IF LEVEL dBm control, 1dB step		1
3	ΔF SWEEP VERNIER control		1
4	IF LEVEL VERNIER dB control		1
5	RF LEVEL ADJUST dBm control		1
6	Z25, RF Switch		1
7	Z12, Digital Switch Board		1
8	Z8, Front board		1
9	AT1, Att, R var, 10dB, 11p		1
10	AT2, Att, R var, 60dB, 7p		1
11	Z10, Counter input board		1
12	Z11, Counter display board		1
13	Z7, Switch board		1
14	J3, BNC Receptacle		1
15	J2, Cable		1
16	Z14, IF MISMATCH 20dB		1
17	Filter, display		1
18	Panel, front		1
19	Plate, sub-panel		1
20	Cap Screw		8
21	Screw		4
22	Screw		7
23	Screw		12
24	Screw		6
25	Screw		3
26	Nut		4
27	Screw		12
28	Not assigned		
29	Not assigned		
30	Not assigned		
31	Not assigned		
32	Not assigned		
33	J9, Semi-rigid cable	002	1
34	J15, Semi-rigid cable	001	1
35	J17, Cable		1
36	J1, Semi-rigid cable	002	1
37	Z27, Split Detector	002	1
38	Z28, Mixer	002	1

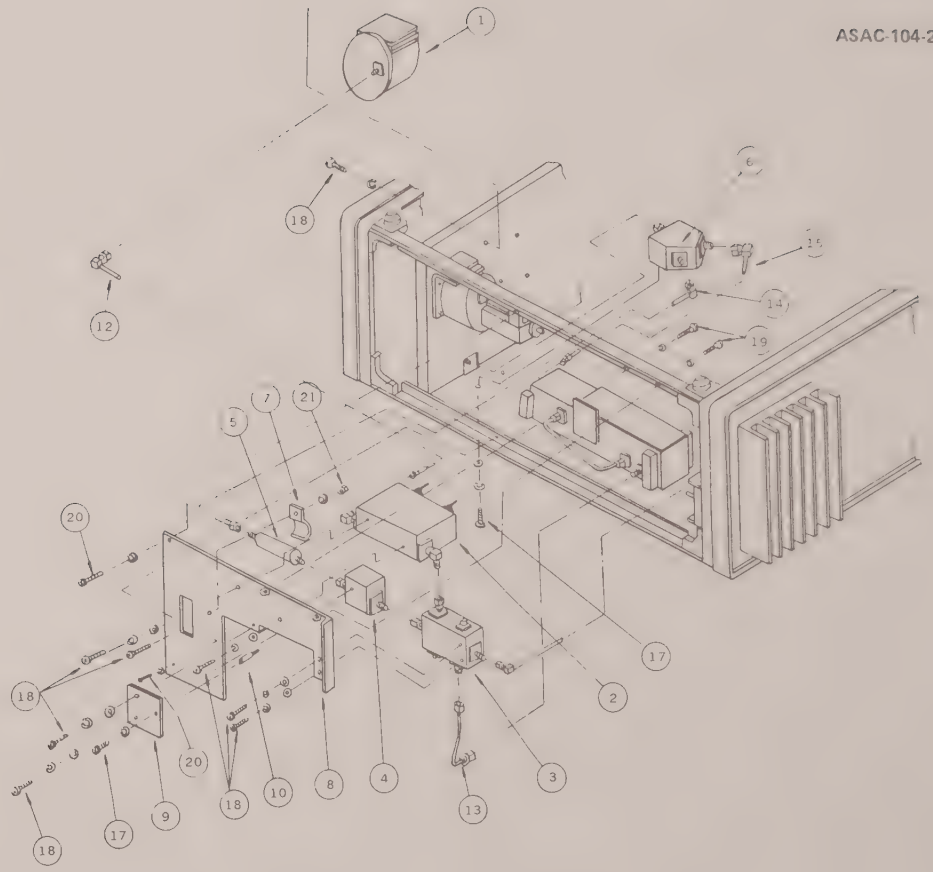
Fig. 13–Sending Unit Assembly, Overall



No.	Description	Option	Q'ty
1	Z16, 11GHz YTO	001	1
2	Heat sink	001	1
3	Z17, Coaxial isolator	001	1
4	Z20, 4/6GHz YTO		1
5	Z21, 4/6GHz RF circuit		1
6	Z22, 1GHz VCO		1
7	Z18, PIN Modulator	001	1
8	Z19, LPF	001	1
9	Z26, 4/6GHz AMP		1
10	Q1, Transistor		1
11	Q2, Transistor		1
12	J13, Semi-rigid Cable	001	1
13	J14, Semi-rigid Cable	001	1
14	J15, Semi-rigid Cable	001	1
15	J17, Cable		1
16	J16, Cable		1
17	Holding clamp		1
18	Angle	001	1
19	Angle		1
20	Insulation plate		2

No.	Description	Option	Q'ty
21	Insulation Bushing		4
22	Screw	001	4
23	Screw	001	4
24	Screw		4
25	Screw		5
26	Screw	001	2
27	Screw	001	1
28	Screw		1
29	Screw		4
30	Screw		1
31	Screw	001	1
32	Screw	001	1
33	Screw		4
34	Nut		4

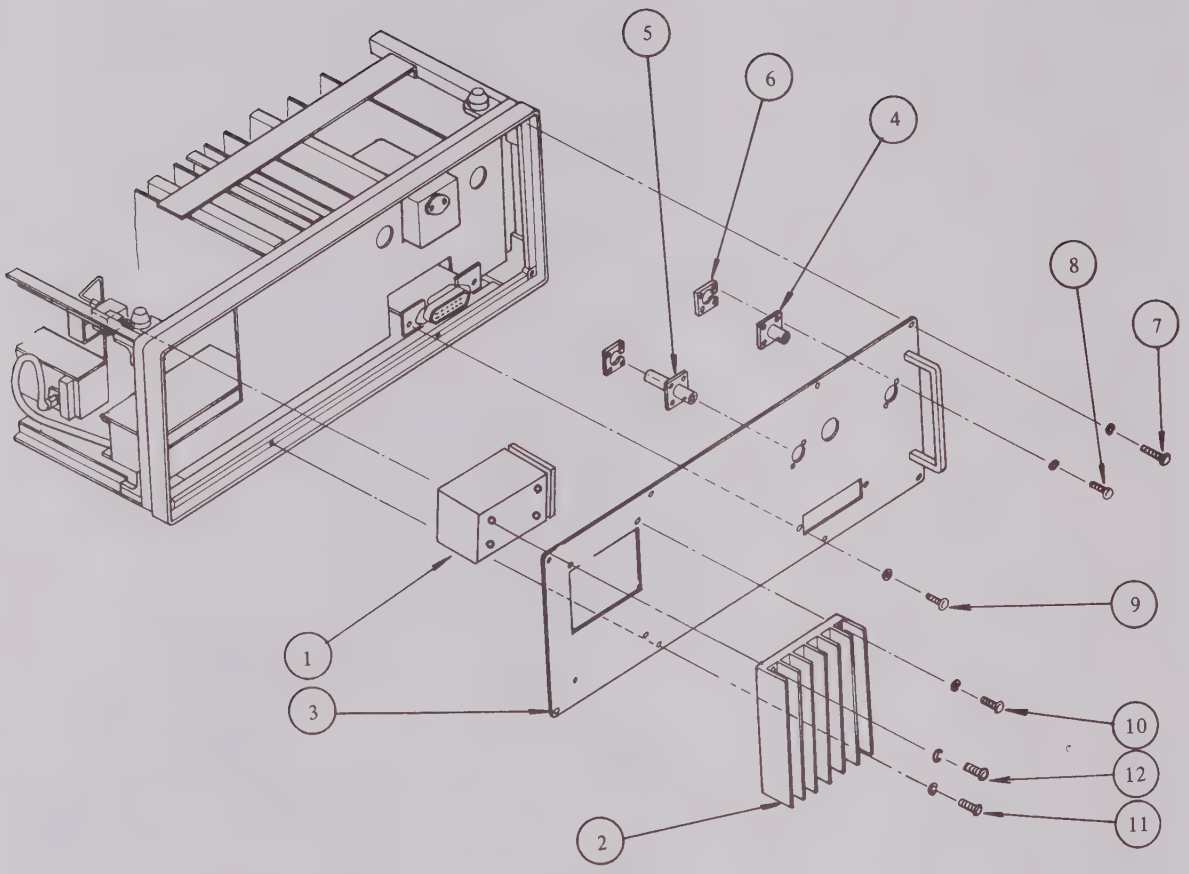
Fig. 14 (a)—RF Oscillator Assembly-1



No.	Description	Option	Q'ty
1	Z29 2GHz YTO	003	1
2	Z30 2GHz AMP	003	1
3	Z31 COUPLER	003	1
4	Z32 PIN MODULATOR	003	1
5	Z33 LPF	003	1
6	Z24 RF SWITCH	003	1
7	Holding Clamp	003	1
8	Plate, Sub-chassis	003	1
9	Plate, Pin modulator 4	003	1
10	Terminal	003	1
11	Blank		

No.	Description	Option	Q'ty
12	J25 Cable	003	1
13	J18 Semi-rigid Cable	003	1
14	J19 Cable	003	1
15	J17 Cable		1
16	Blank		
17	Screw	003	3
18	Screw	003	11
19	Screw	003	2
20	Screw	003	2
21	Nut	003	1

Fig. 14 (b)—RF Oscillator Assembly-2 (OPTION 003)



No.	Description	Option	Q'ty
1	Z16, 11GHz YTO	001	1
2	Heat sink for 11GHz YTO (Z16)	001	1
3	Rear Panel		1
4	J4, BNC Receptacle		1
5	J5, Cable		1
6	Nut plate		2
7	Screw		4
8	Screw		4
9	Screw		2
10	Screw	001	4
11	Screw		4
12	Screw	001	4

Fig. 15—Sending Unit Rear Panel Assembly

3. DEVICES ASSEMBLIES

Figures 16 to 18 show devices assemblies (IF/RF Power Head, coupler).

IF Power Head

Removal

1. Remove a hexagon nut (1), and a washer (2).
2. Remove four screws (8), and a plate (3).
3. Pull out the Ring (4) and the inner conductor (5) from the cap connector (6).
4. Remove four screws (9), and the body (7).
5. If the head is further disassembled into its separate parts, its electrical characteristics will be changed.

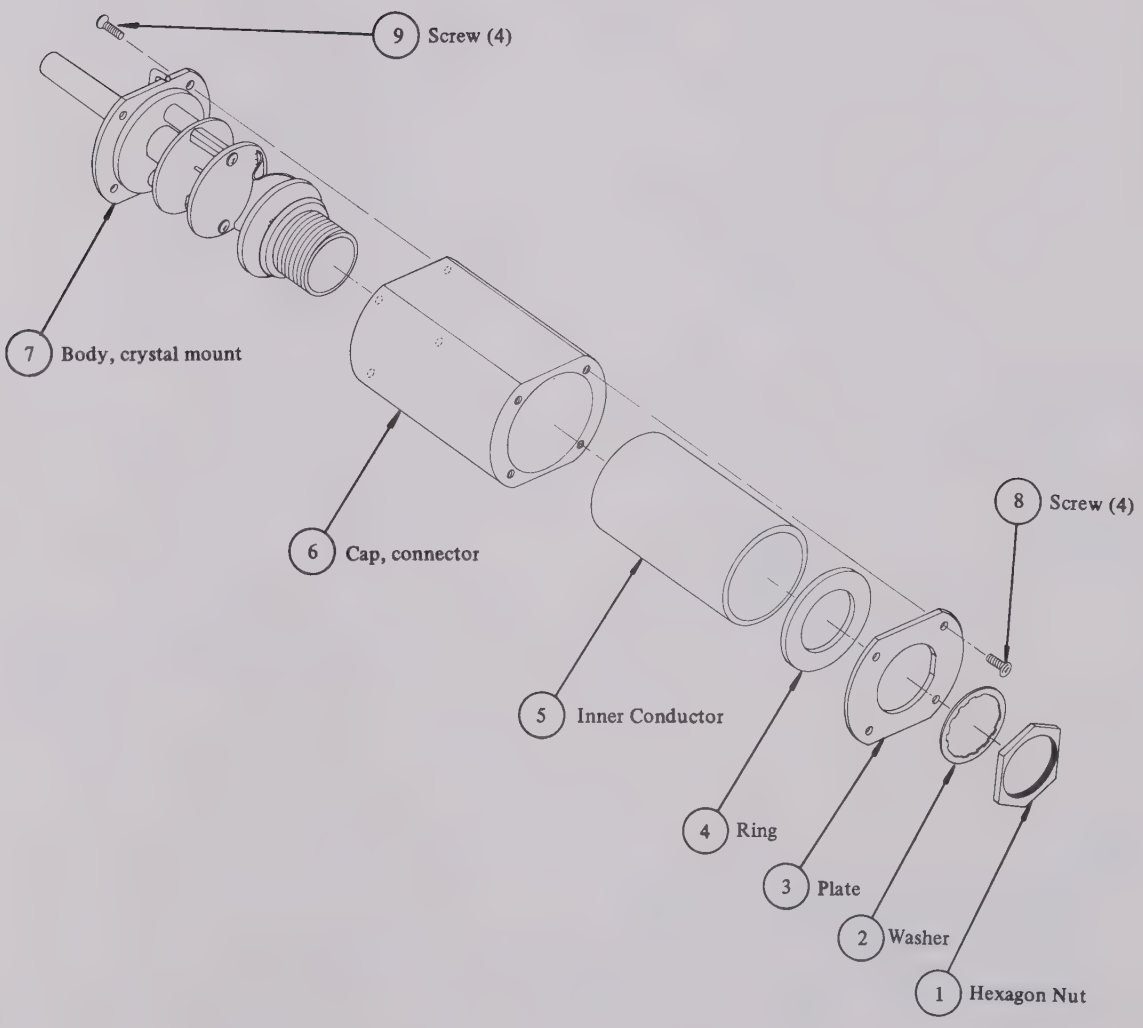
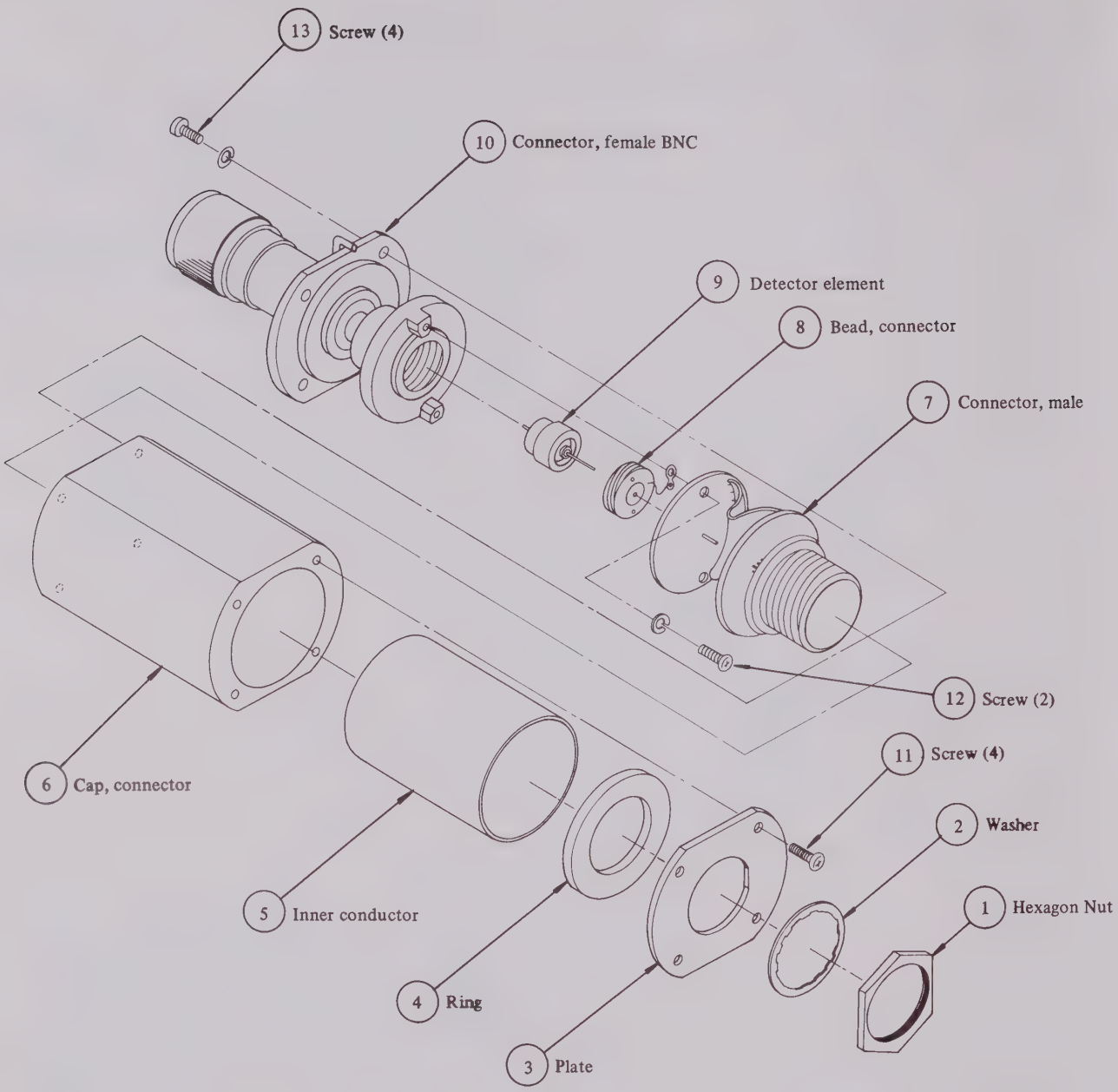


Fig. 16—IF Power Head Assembly



Removal

1. Remove a hexagon nut (1), and a washer (2).
2. Remove four screws (11), and a plate (3).
3. Pull out the Ring (4), inner conductor (5) from the connector cap (6).
4. Remove four screws (13), and the connector cap (6).

Fig. 17—RF Power Head Assembly

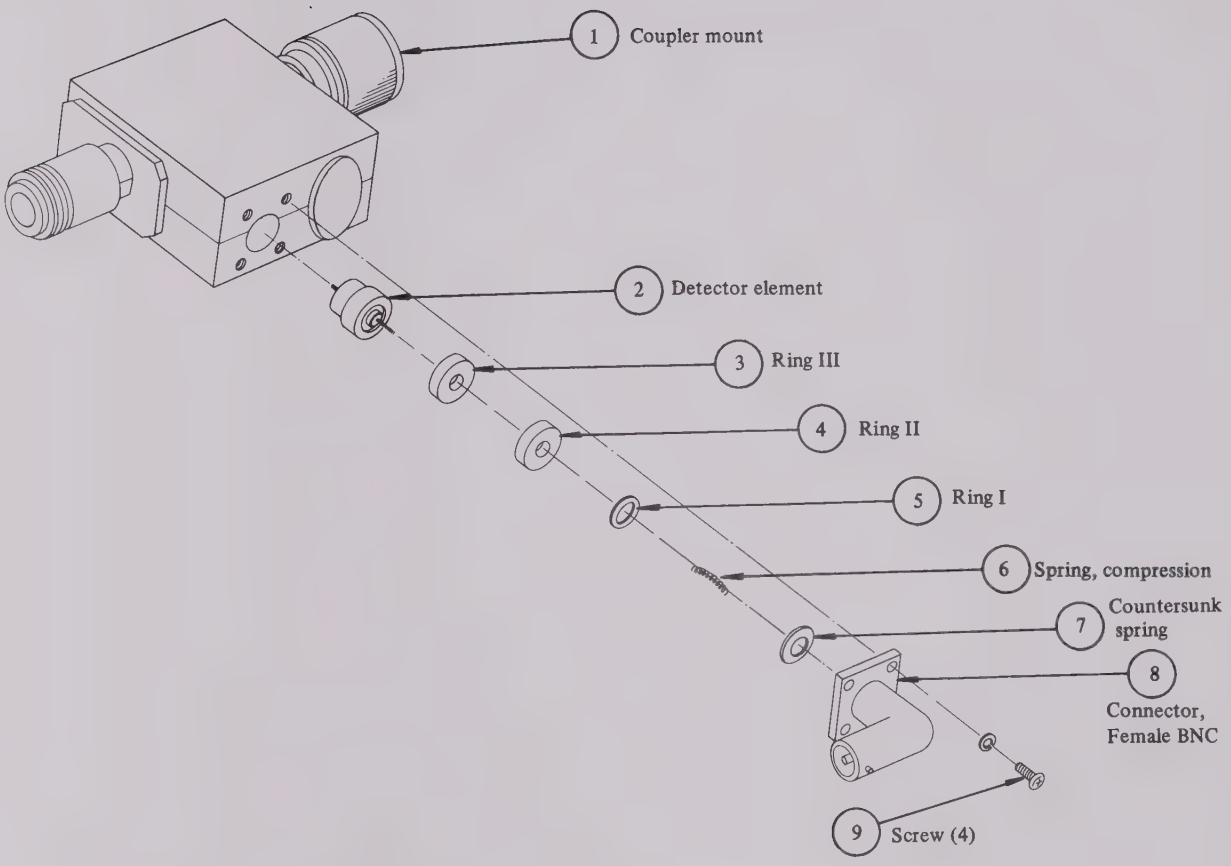


Fig. 18—Directional Coupler Assembly

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